URBAN HOUSEHOLD DEMAND FOR MEAT AND MEAT PRODUCTS IN NIGERIA: AN ALMOST IDEAL DEMAND SYSTEM ANALYSIS

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ABSTRACT
This study is based on micro level data on urban household food consumption and expenditure collected between 1999 and 2000 in three Nigerian cities. The LA/AIDS model, which allows the inclusion of demographic variables, was applied to a subset of the data on meat and meat products namely beef, mutton/goat, chicken, fish, eggs, and milk. Results indicate that urban demand for meat products will continue to increase as incomes improve, suggesting potential market opportunities especially for poultry. Intra-household demand patterns clearly indicate the importance of beef for children but contrary to expectations, there is a reduced demand for milk as the number of infants in urban households increase. The observed high income elasticity of demand for poultry products may have a positive impact on the derived demand for maize, a primary product in poultry feed. Encouraging poultry production will help restore the battered agricultural sector of Nigeria, increase farmer income, reduce unemployment, and conserve foreign exchange earnings.

Keywords: Urban households, Meat demand, Demand analysis, Nigeria

INTRODUCTION

Nigeria has the largest population in sub-Saharan Africa. About 47% reside in the urban areas where the population growth rate is estimated at three times that in rural areas (World Bank, 2004). This suggests a shift in increased food demand from the rural to the urban areas. Government policies tend to favor the urban dwellers to the detriment of the rural areas. Over the past three decades, rural households have been significantly poorer than urban households. However, while urban poverty has increased, rural poverty has decreased, especially after the post-adjustment period: 1995 to date (Canagarajah and Thomas, 2001). Urbanization is therefore a key non-income factor explaining the change in demand for animal protein (Ahmed and Gruhn, 1995). Consumption of animal protein has been found to be higher in urban areas than in rural areas (Hussain, 1990). Rising incomes, changing tastes and preferences are likely to shift the demand for meat and meat products. In developing countries, meat demand has been shown to increase more rapidly than disposable income (Ahmed and Gruhn, 1995). Differences in consumer behavior and demand for meat products, particularly dairy products, exist in Nigeria because the country is diverse and characterized by regional, physical, agro climatic, socioeconomic, and cultural/ethnic differences in food habits (Jabbar and di Comenico, 1993)

Demand for meat and meat products has been assessed as an aggregate subset of the food category or analyzed as one or two products separately from the general meat category in different countries (Bewley, 1987; Heien and Pompelli, 1988; Savadogo and Brandt 1988; Heien and Wessells, 1990; Abdulai and Jain, 1999). Goungetas *et al.* (1993) made projection estimates for food and non-food commodities in Indonesia and desegregated data on the meat category (e.g. red meat, poultry, fresh and dried fish, eggs, and dairy products) as a subset of the food category. Mdarfi and Brorsen (1993) estimated the demand for poultry and fish in Morocco using Almost Ideal Demand System while Karagiannis *et al* (2000) applied an error correction model to the Almost Ideal Demand System using time series data for meat in Greece.

The objective of this study is to fill a gap in the literature by estimating demand functions for urban households in Nigeria. Income and price elasticities are needed to formulate policies, set priorities, and

engender investments in the livestock sector. Hence, an understanding of household consumption patterns of meat and meat products, especially the effects of income and price on meat demand and the impact of demographic factors on urban household meat consumption (Young and Hamdok 1994) could provide important policy insights for Nigeria.

RESEARCH METHODOLOGY

Data Source

This study is based on micro level data on Food Demand Structures executed by the International Institute of Tropical Agriculture (IITA), in Nigeria. As with many developing countries, especially in Africa, data from official sources have several shortcomings. First, available data on food consumption patterns for Nigeria are out-dated and provide sub aggregate level information on food and non-food items. The last survey conducted in 1992 by the Federal Office of Statistics, suffers from gross underestimation problems, as information was under-represented on alternative sources of income such as remittances and non-formal income-yielding economic activities (Canagarajah and Thomas, 2001). The survey was also unable to provide precise information and detailed analysis on intra-household consumption patterns.

The data set for this study contains the 1999-2000 urban household food consumption and expenditure patterns during one week, repeated six times for 960 households selected from Abuja, Kaduna and Kano - three major cities in Nigeria. Households in each of the three cities were the basic sampling units for the survey. In arriving at this basic unit, a multistage stratified random sampling technique was used for each city. First, a list of enumeration areas (EAs) was obtained from the National Population Commission (NPC) in each city. The EAs are the primary sampling units used by the NPC for the purpose of the national population census (last held in 1991) and other similar studies. Each city is divided into administrative units called Local Government Areas (LGAs). The LGAs for each city were grouped (clustered) into areas of low, moderate, and high population density. Two LGAs were randomly selected from each cluster. A list of all EAs from the selected LGAs for each city was obtained from the NPC, and EAs selected using a systematic sampling technique from a random start. Using the updated maps, a list of dwelling houses was developed for each selected EA. Enumerators numbered houses and using a systematic sampling technique from a random start, houses were selected. From the selected houses, a complete census of households residing in each house was conducted and samples drawn for the study for each city using the same random technique. A total of 960 households, 225 from Abuja, 360 from Kaduna, and 375 from Kano, were randomly selected for the study. Households that dropped out of or withdrew from the survey were replaced with similar ones, thus maintaining the same sample size throughout the study period.

Each household was surveyed every 2 months by enumerators drawn mainly from the NPC and the Agricultural Development Projects. The household member identified as the person responsible for food planning, purchasing and preparation was always interviewed, with other household members encouraged to actively participate to ensure completeness of data. For each survey period, households were contacted at least a week before the reference week by enumerators, and reminded to note down their food and non-food expenditure patterns. To ensure access to all members of each survey household, two enumerators (a man and a woman) visited the households to administer the questionnaire. During the interview week, the enumerators recorded food and non-food consumption and expenditure patterns of households. Data on infrequently purchased items were collected every quarter. Questions were grouped into socioeconomic characteristics of households, purchases, and non-purchases of various groups of foods (cereals, roots and tubers, grain legumes, vegetables, meat and meat products), and non-food items. Among the food groups, data sets for meat and meat product consumption were extracted and analyzed for this paper. The items surveyed included quantities of beef, mutton/goat meat, chicken, fish eggs, and (fresh and packaged) milk consumed by the household and the expenditure on each. These meat and meat product types are representative of the various meat types commonly consumed in Nigeria.

Model Selection

According to utility theory, the consumption pattern of any household will depend on the household's preferences, income, prices, as well as particular biogenetic and other needs. Also, it will depend on the household's composition (age, sex, gender, etc.) as well as social class. In estimating the demand relationships, the formulation of a model expressing these relationships between consumption and the relevant explanatory variables is paramount.

Various estimation functions have been developed and applied over the years. In their review of such models, Sadoulet and de Janvry (1995) indicated that three demand systems have received considerable attention because of their relative empirical expediency. These are the Linear Expenditure Systems (LES) developed by Stone (1954), the Almost Ideal Demand Systems (AIDS) developed by Deaton and Muellbauer (1980) and the combination of these two systems into a Generalized Almost Ideal Demand Systems (GAIDS) proposed by Billino (1990). Another variant of the AIDS model is the Quadratic Almost Ideal Demand System (QUAIDS) derived by Banks *et al* (1997) and recently applied by Abdulai (2001). Implications for each of these specifications have been well reviewed in the literature on demand analysis (Wohlgenant 1984; Lee *et al*. 1994).In this paper, the LA/AIDS model is used to estimate the elasticities of demand for meat and meat products: beef, mutton and goat meat, chicken, eggs, fish and milk. Because of its flexibility as a complete system this model has been used for similar studies in West Africa (Savadogo and Brandt, 1988), India (Abdulai and Jain, 1999), Greece (Karagiannis *et al*, 2000), Morocco (Mdafri and Brorsen, 1993), Myanmar (Soe *et al*, 1994), and the United States of America (Heien and Pompelli, 1988). This means that it can be restricted to satisfy the conditions of adding-up, homogeneity, and symmetry. Where household expenditure data are used to estimate demand parameters, the LA/AIDS model has been found to satisfactorily explain demand responses (Lee *et al*. 1994). In formulating the meat demand model, household data were used as these avoid the problem of desegregating over consumers. Weekly data from each panel household were collected six times during the period, thus the problem of non-consumption as suggested by Hein and Wessells (1990), is avoided. Censoring is required only when one data point is used, increasing the probability of non-consumption, as in the case referred to by Hein and Wessells (1990).

Specification of the LA/AIDS model

The expenditure share equation for the LA/AIDS model is

$\omega_i = a_i + \sum\gamma_{ij}In\rho_j + \beta_i In\,(x/P)$---------- (1)

Where ω_i is the budget share of commodity $_I$, ρ_j price of commodity j, x is total expenditure, P is price index defined by:

$LogP = a_0 + \sum a_j In\rho_j + 1/2 \sum\sum\gamma_{ij}In\rho_i In\rho_j$---------- (2)

The theoretical properties of adding up, homogeneity in prices and income and symmetry of cross effects of demand functions are subject to the following parametric restrictions:

Adding up $\sum a_i = 1; \sum\gamma_{ij} = 0; \sum\beta_i = 0$----------(3.1)

Homogeneity $\sum y_{ij} = 0$----------(3.2)

Symmetry $\gamma_{ij} = \gamma_{ji}$---------- (3.3)

The focus of this paper is to estimate a separable demand system for meat and meat products. We are therefore concerned with the effects of economic and demographic variables on demand for meat and meat products. To effectively include demographic variables in the function, a Stone price index is defined, as suggested by Deaton and Muellbauer (1980), as:

$InP^* = \sum\omega i In\rho_i$ ----------(4)

The use of the Stone price index enables the inclusion of demographic characteristics through either translation or scaling methods (Sadoulet and de Janvry, 1995). For commodities which are consumed, the translation approach is more appropriate for modeling demographic effects. The Stone price index also improves the linear approximation of the model where prices are involved.
The intercept term in the equation 1 is thus specified as:
$\alpha_i = \alpha_0 + \sum\alpha_{ij}D_j$
where D_j is the jth demographic variable.
The extended model including demographic variables and error term (υ_i) is defined as:
$\omega_i = \alpha_0 + \sum\alpha_{ij} D_j + \sum\gamma_{ij} \text{In } (\rho_j) + \beta_i \text{ In } (x/P) + \upsilon_i$----------(5)
The budget share equations were estimated simultaneously as a system of equations using the Statistical Analysis System (SAS).

The price and expenditure elasticities were derived from the parameter estimates of the model using the following formulae:
Own-price elasticity: $\sum_{ii} = -1 + (\gamma_{ii}/\omega_i) - \beta$----------(6.1)
Cross-price elasticity: $\sum_{ij} = (\gamma/\omega_i) - \beta_i\omega_j/\omega_i)_I$ for I not equal to j (6.2)
Expenditure elasticity: $\sum_i/\gamma = 1 + (\rho_i/\omega_i)$----------(6.3)

A priori Expectations
The demographic variables included in the model were household age composition and income group.

Household Age Composition: Age of household members is grouped into six categories: 0 - 5 years (infants), 6 - 15 years (children), 16 - 25 years (young adults), 26 - 45 years (adults), 46 - 65 years (old adults), and above 65 years (retirees/aged). It is postulated that consumption of meat types, namely beef, mutton/goat, chicken and fish, will differ by household age composition. The effect of changes in household composition (e.g. addition of a child) with unchanged household income has two effects, an income effect and a specific ('hungry mouth') effect (Young and Hamdok, 1994). Infants and children may have large specific demands for particular meat products such as eggs and milk while older members would tend to abandon eggs and milk in their food menu (Young and Hamdok, 1994), since these may no longer be considered very necessary. The addition of more infants and younger children to the household would tend to increase their (household) expenditure on eggs and milk

Income Group: This is divided into four (1st, 2nd, 3rd, and 4th) quartiles. Food shares are modified partially by the level of income. We postulate that income will affect the demand for meat and meat products positively. Meat (on the aggregate) has positive income elasticity, increasing and greater than unity at high-income levels (Waterfield 1985; Alderman, 1986; Teklu, 1996). However, information on income effects within the meat subgroup is unknown for Nigeria. We therefore expect positive income elasticity for all meat products.

RESULTS AND DISCUSSIONS
Descriptive Analysis
Average per capita expenditure on meat and meat products in the study area were N711.93 (or US$7.12) per month in the year 2000. Most households (77%) consume beef followed by fish (68%), milk (47%), egg (45%), chicken (22%), and mutton and goat meat (15%) (Table1). Pork and mini-livestock were dropped from the analysis because of the relatively low proportion of households that consume these meat types (mini-livestock, 4% and pork 1%). Pork in particular is hardly eaten in the study area (northern Nigeria) because the Moslem religion forbids its consumption. Most households in the higher income group (1st quartile) consume mostly chicken, eggs and milk. The poorer households consume more fish and beef. Richer households have larger families (9 members on average) compared to poorer households

(5 members). This is probably because it is common practice in Nigeria for richer households to co-opt some of the children of their extended family relations. They also have live-in house helps and servants.

Observations with respect to consumption of milk follow location differences consistent with Jabbar and di Comenico (1993). Fresh milk is consumed mostly in the urban city of Kano (45%) than in Kaduna (30%) and Abuja (25%), which are located further south of Kano. Fresh milk is more available in Kano, where dairy production is more developed than in any of the two other cities. More households in Abuja (43%), followed by Kaduna (36%) and then Kano (20%) on the other hand consume packaged milk. This suggests that as you move from the major fresh milk-producing zones towards the south milk switches from less to a more value-added product. The unit price of packaged milk (N148.84) exceeds that of fresh milk (N112.4) by 57%. Table 2 presents the mean monthly urban household expenditure on meat and meat products by income groups. On the average, milk and chicken are the most expensive meat products, followed by beef, mutton/goat meat, and lastly eggs. The trend from Table 2 is that the higher the level of income the higher the expenditure on meat and meat products.

Empirical Results

The parameter estimates of all the variables included in the LA/AIDS model are presented in Table 3. The coefficients of the variables can be interpreted directly as increases or decreases in the proportion of meat and meat products budget allocated to each of the meat/meat products. All the own price variables are significant and possess the expected (negative) sign, suggesting that an increase in prices will lead to a decrease in the quantity of meat products demanded. For beef, a 10% increase in price will result in a 15% reduction in the demand. Urban households will compensate for this reduction by increasing their demand for mutton and goat meat by about 27% and chicken by 12%. A 10% increase in the price of mutton/goat meat will lead to a large (47%) reduction in its demand. With respect to chicken, a 10% increase in prices would lead to a 30% decline in its household budget. This reduction in the demand for chicken is significantly (at 1%) compensated for by increased demand for beef (9%), fish (7%), egg (10%), and milk (3%). With respect to fish, a 10% increase in prices would lead to a 13% reduction in its demand. Interestingly, urban households would prefer to switch their demand to chicken (white meat) significantly (at 1%) rather than to red meat if there is only a an insignificant increase in the price of fish. This may suggest that urban households in Nigeria are becoming conscious of the advantages of white meat, which is considered healthier (less cholesterol) for adults than red meat. A 10% increase in prices would lead to a 6% decline in urban household demand for eggs. This decline is compensated for by an increase in the demand for fish (3%) and beef (4%). A 10% increase in the price of milk would lead to a 12% reduction in its demand. Urban households will compensate for this by increasing their demand for chicken significantly (at 5%), which incidentally is also an expensive meat product, like milk. The general trend is that urban households will respond differently to a small change in the market prices of meat products. Chicken seems to have a greater number of other meat products as substitutes in response to price changes while urban households do not seem to switch their demand to other meat products, given a small change in the market price of mutton and goat. A similar trend was also observed for chicken by Soe *et al.* (1994) in Myanmar (Burma), while mutton was found to be a luxury good in Morocco (Mdarfi and Brorsen, 1993).

With respect to intra-household consumption patterns, results (Table 3) indicate that the demand for beef rises notably in households with children aged 0 to 5 years Adding a child aged 0 to 5 years is equivalent to a significant (at 1%) rise of 14% in per capita total expenditure on beef and 6% for eggs. The effect on mutton/goat meat, chicken, fish, and milk is negative. The case of milk is contrary to *a priori* expectations. It was anticipated that expenditure on milk would increase with the addition of infants (0 to 5 years) to the household but this was not the case. This can be explained by the prevailing baby-friendly policy of hospitals in Nigeria that encourage mothers to feed their babies solely with breast milk in the first 2 years after birth. The high cost of packaged milk may also encourage this practice and may be

another reason why households cannot buy milk as much as required for young children. Presently, there is no milk subsidy for children below 5 years of age in Nigeria.

As the child grows older (6-15 years), the urban household demand for beef may rise significantly (at 5%) by 9% but decline significantly (at 1%) for fish by 10%, egg (by 7%) and milk (by 6%). Households with older (46-64 years) and retired (over 65 years) adult members tend to cut down on their demand for milk and eggs. This is expected because both milk and eggs have little or no food value for people within this age bracket. Young and Hamdok (1994) also observed negative significant effects for milk on household food expenditure with the addition an adult member in Zimbabwe.

Income level is an important factor in explaining meat product budget share allocation in urban households. The general trend from Table 3 is that the first three income groups behave alike. They tend to increase their demand for eggs significantly (and milk specifically for the second income group). The poorest households' preferences are predominantly for fish, which is the least expensive meat product and significantly (at 5%) reduce their demand for beef.

Demand Elasticity for Meat Products

The estimated own-price, cross-price and income (expenditure) elasticity are presented in Table 4. The diagonal values represent own-price elasticity. The negative values of own price elasticity coefficients for the estimated variables are consistent with economic theory. The coefficients reveal that meat products are price inelastic. This suggests that urban households in Nigeria are very sensitive to price changes for all meat-based products. The case of mutton and goat meat is glaring, as a 10 percent change in the price of mutton will lead to a large reduction in the consumption of mutton and goat meat. The cross-price elasticity estimates may indicate that on the aggregate, meat products do not substitute for each other but this depends on income level (as we shall see later). Table 4 also indicates that, on the aggregate, the income elasticity of demand for chicken and eggs is elastic in urban areas. A unitary elastic demand is observed for mutton and goat. Hence as urban household incomes increase, the demand for poultry products (chicken and eggs) will continue to increase.

Comparative analysis (Table 5) between high (first two income quartiles) and low income (the last two income quartiles) groups indicate that own price elasticity effects are larger in absolute terms for lower income urban households than higher income households. The magnitude of own-price elasticity and expenditure elasticity declines as income increases, indicating that the proportion of income allocated to meat products is higher for poorer households than for richer households. This observation is consistent with classical economic theory. Poorer households spend a relatively greater proportion of their income on food items, including meat and meat products than richer households. Expenditure elasticities for the high-income households are positive and values are above one for chicken, mutton and goat, eggs and milk. Chicken, eggs, and milk are highly elastic also among the urban low-income households. This actually indicates that mutton and goat meat are high-income meat products. This observation is important because the study was conducted in northern Nigeria where mutton is a high-value meat product, especially during Moslem festivals.

The nature and extent of substitution is indicated by the cross-price elasticity between meat products. From Table 5, beef seems to have substitutes among the urban high-income group. A rise in the price of beef would lead to an increased demand for mutton/goat meat by 26%, fish (25%), egg (13%), and milk (12%) These meat products may serve as alternative meat types (especially mutton/goat meat) or as cheaper sources of protein (e.g. fish, eggs, and milk) for richer urban households. There does not seem to be any substitutes for meat products among the low-income urban households.

POLICY IMPLICATIONS

From the above results, it is clear that the demand for poultry products will continue to increase as urban household incomes continue to increase. Positive changes in urban household income are expected if the extensive program reforms by the democratically elected government of Nigeria are sustained. Maize is the primary input in poultry feeds, especially under the intensive (not free range) poultry production systems. Over the past ten years (1989 - 1999) about 20% of the total maize output in Nigeria was used as animal feed (FAOSTAT, 2002). In the last 20 years the country has also witnessed a maize revolution in its agricultural sector with farmers in the Guinea savanna switching from millet to maize production as a result of research and increased agro-industrial utilization (Smith *et al* 1994). The high income elasticity observed for poultry products in urban households in the country may encourage the further expansion of maize production and perhaps increase farmer incomes if the trend continues. This has implications for fertilizer availability as the increased maize production has been attributed to subsidized fertilizer and a ban on maize imports. For instance, the government of Nigeria placed a 70% duty on maize imports, suggesting that supplementation through this means may be too expensive if the derived demand for the crop increases. Similarly, there is also competition for maize for direct household consumption and for agro-industrial processing. A rapid expansion of maize production in Nigeria will therefore be necessary to achieve the desired production increases in the poultry industry without undue pressure on (maize) prices.

CONCLUSION

This study has shown that it is possible to estimate demand for meat and meat products individually rather than as an aggregate subset of the food group for urban households in Nigeria using micro level data. One importance of the study is to demonstrate the need to use cross-sectional data where official data are either not available or unreliable. The estimates from the LA/AIDS model on meat and meat products demand are consistent with economic theory. The study has also demonstrated that demographic variables such as household structure affect the demand for meat and meat products in urban areas and must be included in such studies.

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Table 1: Percent distribution of households by income group and consumption of meat products

	Income Quartile				
	I	II	III	IV	All
Beef	28.03	26.44	24.91	20.63	77
Mutton/goat	29.76	25.23	23.41	21.60	15
Chicken	45.79	28.55	16.84	8.82	22
Fish	28.73	25.55	24.60	24.40	68
Egg	38.00	27.50	22.65	11.85	45
Milk	36.71	29.58	21.25	12.46	47
Mean household size	9.43	7.11	6.29	5.15	7.00

Table 2: Mean monthly expenditure on meat/meat products by income groups in Nigeria

	Income Quartile				
	I	II	III	IV	All
Beef	598.82 325.85	234.06 169.88	`85.58		
Mutton/goat	429.27 210.73	131.02 133.53	184.24		
Chicken	519.51 351.38	303.88 272.13	199.15		
Fish	275.41 170.43	119.65 83.82	183.50		
Egg	177.14 132.47	94.49	94.13	111.33	
Milk	209.93 154.90	113.48 90.69	245.01		
Monthly income	81454.63	25400.21	15447.87	8024.3930081.18	

Table 3: Model Estimates of Urban Household Demand for Meat Products in Nigeria

Variable	Parameter Estimates Beef	Mutt/Goat	Chicken	Fish	Egg	Milk
Intercept- -	-0.065	0.977*	-0.036	0.142	0.10	0.165
	(-0.34)	(9.75)	(-0.31)	(-0.86)	(1.20)	(1.83)
Price Variables						
Beef	-0.152	0.009	0.093*	0.012	0.035**	0.003
	(-4.65)	(0.55)	(4.74)	(-0.42)	(2.46)	(0.20)
Mutt/goat	0.265*	-0.476*	0.060	0.082	0.016	0.054
	(4.32)	(-14.85)	(1.63)	(1.56)	(0.60)	(1.86)
Chicken	0.118*	0.025	-0.295*	0.12*	-0.014	0.047**
	(3.54)	(1.41)	(-14.77)	(4.18)	(-1.00)	2.99)
Fish	0.018	0.006	0.066*	-0.128*	0.031*	0.008
	(0.86)	(0.55)	(5.27)	(-7.17)	(3.41)	(0.78)
Egg	-0.014	0.000	0.104*	-0.012	-0.072*	-0.031
	(-0.37)	(0.03)	(4.70)	(0.38)	(-4.50)	(-1.77)
Milk	0.016	0.015	0.034**	0.040	0.004	-0.102*
	(0.78)	(1.39)	(2.73)	(2.22)	(-0.41)	(-10.30)
Age Composition						
0-5 years	0.014*	-0.001	-0.000	-0.004	0.006*	-0.005
	(3.22)	(-0.60)	(-0.26)	(-0.98)	(-3.34)	(-2.31)
6-15 years	0.009**	-0.000	-0.006*	-0.010*	-0.007*	-0.006*
	(3.26)	(-0.36)	(-3.31)	(4.47)	(-6.24)	(-4.70)
16-25 years	0.007	-0.001	0.006**	-0.007	0.002	-0.003
	(1.86)	(-0.85)	(-2.97)	(2.09)	(-1.17)	(-1.96)
26-45 years	0.008	0.004	-0.005	-0.001	-0.003	-0.003
	(1.66)	(1.43)	(-1.92)	(-0.13)	(-1.37)	(-1.71)
46-64 years	0.010	0.005	0.002	0.008	-0.013*	0.010**
	(1.24)	(1.06)	(0.34)	(1.07)	(-3.73)	(-2.77)
Over 65 years	0.016	0.004	-0.002	0.037	-0.02**	-0.036*
	(0.90)	(0.46)	(-0.18)	(2.42)	(-2.58)	(-4.21)
Income Group						
1st Quartile	-0.032	-0.003	0.008	-0.029	0.032*	0.017
	(-1.90)	(0.39)	(0.85)	(-2.05)	(4.42)	(2.17)
2nd Quartile	-0.051	0.009	-0.019	-0.003	0.356*	0.008**
	(-2.50)	(0.88)	(-1.54)	(-0.18)	(4.02)	(2.90)
3rd Quartile	-0.033	0.01	-0.025	0.010	0.031**	0.008
	(-1.35)	(0.79)	(-1.64)	(0.47)	(2.81)	(0.64)
4th Quartile	-0.08**	0.34	-0.032	0.082*	0.012	-0.018
	(-2.99)	(2.53)	(-2.06)	(3.65)	(1.07)	(-1.46)
F Value- -	13.66*	14.89*	54.40*	18.33*	14.83*	16.05*
Durbin Watson -	1.659	1.735	1.797	1.773	1.816	1.705

Table 4: Own Price, Cross Price and Expenditure Elasticity Estimates for Meat Products in Nigeria

Price Elasticity Meat Product	Beef	Mutton/Goat	Chicken	Fish	Egg	Milk
Beef	-1.20	-1.21	-0.34	-0.23	-0.13	-0.26
Mutton/goat	-2.83	-11.71	-3.23	-2.60	-1.35	-2.52
Chicken	-2.08	-5.21	-2.72	-1.61	-0.78	-1.35
Fish	-0.50	-2.37	-0.69	-1.51	-0.28	-0.53
Egg	-1.92	-6.75	-2.06	-1.71	-1.88	-1.61
Milk	-1.55	-5.99	-1.80	-1.44	-0.75	-2.40
Expenditure Elast.	0.69	1.01	2.78	0.68	1.35	0.92

Table 5: Own Price, Cross Price and Expenditure Elasticity Estimates for Meat Products by high-income and low-income urban households in Nigeria

	Budget	Price Elasticity					
Meat Product s	Share	Beef	Mutt/Goat	Chicken	Fish	Egg	Milk
High-income Households							
Beef	40.50	-0.80	-0.64	-0.26	-0.09	-0.10	-0.18
Mutton/goat	4.14	0.26	-7.42	-3.07	-1.67	-1.34	-2.21
Chicken	13.15	-0.42	-2.08	-2.13	-0.75	-0.53	-0.82
Fish	18.03	0.25	-1.46	-0.64	-1.30	-0.27	-0.46
Egg	8.37	0.13	-3.05	-1.45	-0.79	-1.63	-1.05
Milk	9.82	0.12	-2.17	-1.29	-0.70	-0.56	-1.93
Expenditure Elast.	-	0.62	1.37	2.32	0.63	1.17	1.15
Low-income Households							
Beef	40.61	-1.47	-1.50	-1.51	-0.53	-0.22	-0.29
Mutton/goat	5.15	-4.25	-12.91	-11.98	-4.54	-1.83	-2.35
Chicken	6.25	-4.38	-9.94	-11.03	-4.26	-1.64	-2.08
Fish	23.75	-0.83	-2.57	-2.59	-1.93	-0.38	-0.49
Egg	6.05	-3.99	-10.20	-10.27	-4.09	-2.62	-2.06
Milk	6.81	-3.39	-9.05	-9.11	-3.54	-1.41	-2.81
Expenditure Elast.	-	0.79	0.71	2.91	0.70	1.67	1.19