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Demand analysis for chicken meat, beef and fish among urban households in Edo and Delta states, Nigeria

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Abstract: Recent increases in population growth has created an additional demand for meat in developing countries. Nigeria has the largest population in sub-Saharan Africa, with about 47% of the population residing in the urban areas where the population growth rate is estimated at three times that in rural areas. This suggests a shift in increased food demand from the rural to the urban areas and explains the need to know the demand for meat (which is an important source of nutrient) from different animal sources. This study focused on demand analysis for chicken meat, beef and fish among urban households in Edo and Delta States. The complete demand functions of the various meat types were estimated. The primary data used in this analysis were obtained from a cross-sectional survey of urban chicken meat, beef and fish consuming households in Edo and Delta States. A multi-stage sampling technique was used to select 300 respondents for this study. The Linear Approximate Almost Ideal Demand System was used in analyzing the demand functions of chicken meat, beef and fish. Findings showed that the demand for chicken meat, beef and fish in the study area was so much a matter of own-price, cross-prices and income. The results of the LA/AIDS showed that for the entire sample, chicken had an expenditure coefficient of -0.0007 ($p < 0.01$). With respect to Edo State, chicken had a budget share of -0.2253, cross price effect of 0.1938 with beef and expenditure coefficient of -0.0006 ($p < 0.01$, $p < 0.05$ and $p < 0.01$ respectively). With regards to Delta State, chicken had a budget share of 0.1939. Chicken had a cross price effect of -0.2790 with beef ($p < 0.10$), while beef had a budget share of 0.5694, cross price effect of -0.2790 with chicken and expenditure coefficient of 0.1170 ($p < 0.01$, $p < 0.10$ and $p < 0.05$ respectively). It is recommended that production of chicken meat and the other selected meat types should be increased to meet the present demand. Prices of these commodities should be regulated to avoid the erratic price fluctuations and efforts should be geared towards improving the income earning capacity of households so as to enable them demand for these commodities effectively.

Keywords: Cross-prices, Demand analysis, Households, Own price, Urban

INTRODUCTION

Global demand for dietary animal protein is rapidly increasing, largely due to increased prosperity and urban population growth in developing and transition economies. World demand for meat has risen sharply during the last few decades (Dave, 2003). The key reasons for these increases in meat demand are increasing population, improving technology and increasing incomes. However, despite this overall improvement in technologies and incomes, per capita consumption of meat has lagged especially in the less-developed countries of the world because protein is the most costly food item (Osho and Asghar, 2004). Since the 1970s, global production, consumption and trade of poultry meat have grown faster than that of any other meat (USDA, 1999).

Meat demand in most African countries is very low at a level of 25 g per day and the demand is even lower especially in the Southern and Eastern parts of Nigeria where production of animal protein has not been high enough to meet the demands of a rapidly growing population (Obi, 2003). Regmi (2007) noted that the unprecedented population growth that has occurred in the last half of the century has created an additional demand for meat and general food in developing countries. The projected consumption for meat as a whole is expected to be more than double between 1997 and 2025 from 5.5 to 13.3 million tonnes in Africa (Rosegrant *et al.*, 2005). This increase is partly linked to what is referred to as the "Livestock Revolution" (Delgado *et al.*, 1999). However, the overall annual per capita meat consumption is expected at an average of 44 kg or a total consumption of 326 million tonnes of meat in the developing countries by the year 2050 (Thornton, 2010). The major sources of protein in developing countries are beef, pork, chevon, mutton and poultry meat while other sources, termed miscellaneous, are eggs and milk (USDA, 1999). 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.

Consumption of animal protein has been found to be

higher in urban areas than in rural areas (Hussain, 1990). 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).

Household demand for meat products such as beef, mutton, pork, chevon and chicken are faced with problems which is mostly due to market prices, consumers' taste, credit availability and consumers' wealth. This problem leads to unbalanced diets because meat contributes essentially to human's diet (Aromolaran, 2004) and the consequence of this poor nutritional status is infection which will eventually result in weakness, lethargy, absenteeism, poor productivity and stress (Jamison and Leslie, 2001).

Poultry is the most commonly kept livestock and over 70% of those keeping poultry are reported to be keeping chicken (Armar-Klemesu and Maxwell, 2000). The poultry industry has emerged as the most dynamic and fastest expanding segment in animal husbandry sub-sector. Poultry meat is an important source of high quality proteins, minerals, and vitamins to balance the human diet (USDA, 1999). Due to the favourable nutrient conversion efficiency relative to beef and pork, global poultry pro-duction is projected to double by the year 2030 to meet this demand. The vast majority of the global demand for poultry products will be in the form of chicken meat (Dave, 2003). During the 1990s, when demand growth slowed for other meats, including fish, demand growth for poultry meat accelerated and poultry continued to lead the expansion of meat trade. Although demand for poultry meat was strong relative to demand for other meats in developed countries during the 1990s, the rapid global gains in poultry meat supply, demand and trade were led by gains in developing countries (USDA, 1999). Chicken meat is derived from poultry and it is reputed to be one of the safest meats available, as it is least associated with any side effects of consumption (Obi, 2003). The poultry sub-sector in Africa largely dominated by chickens has grown rapidly over the years although, its future remains uncertain (Gueye, 2003). In spite of that, chicken meat consumption has continuously expanded, especially in the sub-Saharan Africa (SSA) (Hazell, 2007). Moreover, poultry will account for about 40% of the global increase in demand for meat by the year 2020, showing a shift in taste from red meat to chicken (IAASTD, 2009).

The demand for chicken meat in the urban areas has tremendously increased, consequently raising production of chicken in the rural, urban and peri-urban areas (Nyaga, 2007). Beside the failure of meat production capacity to match with the human population growth, the distribution of livestock in Nigeria is apparently lopsided. The growth in consumption especially for chicken is to some extent, attributed to its perception as a healthy alternative to red meats besides the low retail prices and ease of preparation (McCarthy *et al.,* 2004*).* This overall growth in demand for chicken meat would be much accelerated by the surge in human population, rise in incomes, and urbanization (Nyaga, 2007). The demand and need for food is influenced by many factors including population growth and distribution, nutritional requirements, changes in income and movements in relative prices (Maurizio, 2006).

In Nigeria, increases in agricultural production, has not matched the country's population growth rate (Damisa and Hassan, 2008). While food production increases at the rate of 2.5%, food demand increases at a rate of more than 3.5% (FOS, 1996). In addition to poor food supply, Nigeria's agriculture failed to supply adequate animal protein in the diets of a large proportion of the populace (RIM, 1992; FMEDR, 2000; Ojo, 2003). Ikpi and Akinwunmi (1979) described the development of the poultry industry as the fastest means of bridging animal protein deficiency gap prevailing in Nigeria. Sonaiya (1982) had rightly envisaged that as consumers become more articulate and organized; their demand for wholesome animal protein will exert a powerful influence upon quality, production method and strategies. He added that recent increases in expendable income of urban dwellers have tendencies to stimulate greater demand, not only for quality but also quantity of meat products. Regmi (2007) supported this view and noted that the unprecedented growth that has occurred in the last half-century has created an additional demand for meat.

Moreover, when assessing food balances, the literature on the chicken market is mainly concerned with the supply-side factors only (Ikani and Annatte, 2000; Kperegbeyi *et al.*, 2009). Considering the uncertain environment of chicken meat market in the future, the demand-side cannot be neglected.

In the light of the above, the objective of this paper was thus, to analyze demand for chicken meat, beef and fish among urban households in Edo and Delta States. To achieve this, the complete demand function for chicken meat, beef and fish was estimated among consumers in urban households in the study area.

Knowledge on food demand patterns of a particular country is useful to its policy planners in addressing three major policy issues. First, it helps policy planners identify which policy interventions are most appropriate in improving the nutritional status of individuals and households. Second, it is useful in designing various food subsidy strategies that must be pursued by the government. Third, the knowledge on food demand behavior is essential for conducting sectoral and macroeconomic policy analyses (Sadoulet and de Janvry, 1995).

Meat demand is complex, multi-faceted, and evolving as new and important demand drivers develop over time. A number of factors combine to shape consumer meat demand, including traditional economic determinants such as relative prices and consumer income, as

well as non-traditional determinants such as nutrition, diet, food safety information etc. Nutritional scientist have repeatedly drawn attention to the gross imbalance between animal protein availability and human need for such protein in Nigeria. Previous works on demand were either focused on broad group of commodities (such as food, clothing and housing) or whole food groups (i.e. grain, meat etc.).

MATERIALS AND METHODS

Study area: The study was carried out in Edo and Delta States, Nigeria. Based on agricultural development programme (ADP) delineation, the two States are divided into 43 blocks (Local government areas) with 18 in Edo and 25 in Delta. Edo State lies within the geographical co-ordinates of longitudes 05^o 04' and 06^o 43' East of the Greenwich meridian and Latitudes 05^o 44' and 07^o 34' North of the Equator. Edo State is bounded on the North and East by Kogi State, on the West by Ondo State and on the South by Delta State. The State is characterized by a tropical climate that ranges from humid to sub humid at different times of the year, two distinct seasons – rainy and dry seasons and an average temperature ranging from a minimum of 24^{o}C to a maximum 33^{o}C. It occupies a total land area of 17,820 Km^2 with a population of 3,218,332 million people made up of 1,640,461 males and 1,577,871 females (NPC, 2006). The vegetation of the State is characterized by swamps along the coast to evergreen forest and savannah in the North. The State is divided into three (3) Agro-ecological Zones namely; Edo North, Edo Central and Edo South (ESOW, 2014).

Delta State is situated between Latitudes 05^o 00' and 06 ^{o} 30' N, Longitudes 05^o 00' and 06^o 45' E. Delta State is bounded in the North by Edo State, in the East by Anambra State, in the South-East by Bayelsa State and on the Southern flank is the Bight of Benin which covers approximately 160 kilometers of the State's coastline. The State has an estimated population of about 4,098,391 made up of 2,074,306 males and 2,024,085 females (NPC, 2006). The temperature is high, ranging between 28^{o}C and 34^{o}C with an average temperature of 30^{o}C (81^{o}F). The vegetation varies from mangrove swamp along the coast in the Southern part to the evergreen forest in the central parts and savannah in some parts of the Northern ecological zone. The State has Tropical climate marked by distinctive seasons, the Dry and Rainy seasons. The State is made up of three Agro-ecological Zones namely; Delta North, Delta Central and Delta South (Delta State official website).

Sampling and collection of data: A multi-stage random sampling method was used in this study. The first stage involved a random selection of one agro-ecological zone (Edo South and Delta South) out of the three zones (Edo South, Central and North) in Edo State and (Delta North, South and Central) in Delta State. The second stage involved random selection of one major urban city (Benin City and Warri Metropolis) in each of the selected zones. At the third stage, three local government areas were randomly selected from the selected urban cities. From Benin City, the local government areas selected were Egor, Oredo and Ikpoba-Okha, while local government areas selected from Warri were, Warri-South, Udu and Uvwie. The fourth stage involved simple random sampling of two communities in each of the selected local government areas; Egor (Uselu and Ogida), Oredo (Ugbor and Ekenwa), Ikpoba-Okha (Aduwawa and Ogbesan), Warri-South (Edjeba and Igbudu), Udu (Enerhen and Aladja) and Uvwie (Ugborikoko and Ugboroke). At the last stage, a list of all households in the study area was obtained from national population commission. This list was based on enumeration areas (EAs) used for 2006 census purpose. Using table of random numbers, 25 households were randomly selected from each of the selected communities, giving a total of 50 households from each local government area, 150 households from each urban city and a total of 300 households from Edo and Delta States. However, only meat type that had at least 70% consumption among the households in the study area was considered alongside chicken meat for this analysis (Table 1).

Table 1. Number of respondents in different blocks of both States used in the study.

State	Local government areas (Blocks)	Communities (Cells)	Number of respondents
Edo	Egor	Uselu	25
		Ogida	25
	Oredo	Ugbor	25
		Ekenwan	25
	Ikpoba-Okha	Aduwawa	25
		Ogbesan	25
Delta	Warri South	Edjeda	25
		Igbudu	25
	Udu	Enerhen	25
		Aladja	25
	uvwie	Ugborikoko	25
		Ugboroke	25
Total	**6**	**12**	**300**

Measurement and standardization of variables: Owing to the difficulties involved in measuring and quantifying social variables especially when the study involves collecting data from respondents characterized by poor record keeping, all measurements of variables were taken in their local form. The scale and ranges used for several measures are described below:

The dependent variable, expenditure share, was measured using the expenditure dimension. The expenditure share is the ratio of expenditure on a food item to the total food expenditure. The independent variables included the socio-economic characteristics of the respondents such as sex, educational status, marital status, age, household size, occupation and

income.

- Sex was measured on male and female basis. Male =1 and Female = 2.
- Age was measured in years.
- Marital status was measured on single, married, divorced, separated and widowed basis.
- Educational status was measured and categorized into: no formal education, primary, secondary and tertiary education.
- Income group was measured on monthly family income basis categorized into three groups. Low income group (> N 50, 00), Middle income group (N 50, 00 – N 100,000) and high income group (< N 100,000).
- A household was regarded as all persons living permanently in the home and feeding from the same 'cooking pot' and categorized into small (1-3 members), medium (4-6) and large (above 6 members).
- The prices of meat types were the average market price, at retail level in each community/local government area of study. This was done to ensure the perfect market scenario.

Analytical technique: The Linear Approximate Almost Ideal Demand System (LA/AIDS) of Deaton and Muellbauer (1980) was employed to estimate the demand for chicken meat. To estimate the complete demand function for chicken, beef and fish. In specifying the demand system, the consumers were assumed to allocate their expenditure in two stages. In the first stage, the consumer decided how much to spend on each broad category of goods and services such as food, housing, clothing etc. In the second stage, group expenditure was allocated among the various commodities in that group (Jung, 2000). The LA/AIDS equations were estimated using the Iterative Seemingly Unrelated Regression (ISURE). The set of restrictions such as additivity, symmetry and homogeneity needed for demand analysis of this nature were imposed.

To avoid singularity problem, the beef share equation was dropped from the system of demand equations. Hence, only two of the three equations were estimated. The parameters for beef equation were later re-called using the adding up restriction.

The model used in budget share form is given implicitly as

$$\omega_i = \alpha_i + \sum yij \ln \ln pj + \beta_i \ln X/P + \varepsilon_i \quad \ldots\ldots(1)$$

This was subjected to the restrictions of theoretical properties of adding up, homogeneity in prices and income and symmetry of cross effects of demand.

Adding up $\sum ai = 1; \sum ij = 0; \sum \beta i = 0$

Homogeneity $\sum yij = 0$

Symmetry = $yij = yij$

Where ω_i is the budget share of commodity I,

α_i is the value of the budget share when price and income both equal zero,

pj is the price of commodity j, (by dividing expenditures by corresponding quantities and use them as a direct substitute for market prices)

yij = price coefficients, or the slope coefficient associated with the jth commodity in the ith share equation,

X is total expenditure on all commodities given as $\sum piqi$ in which q_i is the quantity demanded of the commodity

βi = the expenditure coefficient,

ε_i = the error term,

P is price index defined by:

$$\ln p^* = \sum \omega i \ln pi \quad \ldots\ldots\ldots\ldots\ldots\ldots(2)$$

$$\omega_1 = \alpha_{11} + \gamma_{11} lnp_1 + \gamma_{12} ln\rho_1 + \gamma_{13} ln\rho_2 + \beta_1 \ln (X/P) \quad \ldots\ldots(3)$$

$$\omega_2 = \alpha_{21} + \gamma_{21} lnp_1 + \gamma_{22} ln\rho_1 + \gamma_{23} ln\rho_2 + \beta_2 \ln (X/P) \quad \ldots\ldots(4)$$

$$\omega_3 = \alpha_{31} + \gamma_{31} lnp_1 + \gamma_{32} ln\rho_1 + \gamma_{33} ln\rho_2 + \beta_3 \ln (X/P) \quad \ldots\ldots(5)$$

The explicit form of the equation is stated as used by (Ojogho and Alufohai, 2010), and (Erhabor and Ojogho, 2011).

Where:

$\rho_1 - \rho_2$ = Market prices for Chicken meat, Beef and Fish respectively.

α = The value of the budget share in the absence of income and price effects.

ω = The budget share of the commodity

γ =The price coefficients or the slope coefficient associated with any commodity in any other commodity's share equation.

β =The expenditure coefficient of commodity

X =The total expenditure on all commodities

ρ =The price index

RESULTS AND DISCUSSION

Demand function for chicken meat, beef and fish (LA/AIDS estimate): The results of the LA/AIDS as presented in table 2, showed that for the entire sample, chicken had an expenditure coefficient of -0.0007 which is significant ($p < 0.01$). This implies that for N 1 increase in expenditure of respondents in the study area, there would be a decrease in the demand for chicken meat by 07 kobo. This may suggest that chicken meat is being demanded for because of its low retail price. This result of chicken meat demand decreasing with an increase in expenditure of respondents agrees with the work of Ohajianya (2005). The own-price effect of beef is 0.0251, its cross price effect

Table 2. Estimated parameters of the LA/AIDS model.

Parameter	Entire Sample			Edo State			Delta State		
	Chicken i = 1	**Beef i = 2**	**Fish i = 3**	**Chicken i = 1**	**Beef i = 2**	**Fish i = 3**	**Chicken i = 1**	**Beef i = 2**	**Fish i = 3**
α_1	0.3224 (3.65)	0.1344 (0.72)	0.4220 (4.68)	0.2609 (2.79)	0.1970 (1.08)	0.4643 (5.03)	0.5093 (1.38)	-0.4630 (-0.72)	0.1715 (0.70)
γ_{1i}	-0.0257 (-0.37)	-0.0514 (-0.71)	0.0756 (1.62)	-0.2253 (-2.78)*	0.1938 (2.50)**	0.0306 (0.58)	0.1939 (1.24)	-0.2790 (-1.80)***	0.0620 (0.76)
γ_{2i}	-0.0514 (-0.72)	0.2505 (2.38)**	-0.1806 (-2.74)*	0.1938 (2.50)**	-0.0117 (-0.11)	-0.1702 (-2.65)*	-0.2790 (-1.80)***	0.5694 (2.59)*	-0.1549 (-1.27)
γ_{3i}	0.0756 (1.62)	-0.1806 (-2.74)*	0.1058 (1.69)***	0.0306 (0.58)	-0.1702 (-2.65)*	0.1401 (2.24)**	0.0620 (0.76)	-0.1459 (-1.27)	0.0948 (0.85)
β_i	-0.0007 (-28.70)*	0.004 (13.00)*	0.0003 (11.38)*	-0.0006 (-18.48)*	0.0003 (8.77)*	0.0003 (8.77)*	-0.0081 (-0.23)	0.1170 (2.36)**	-0.1091 (-2.49)**

Source: LA/AIDS Estimate

NOTE:Values in parenthesis are t-values, γ_{ij} =Price effects on other meat types, β= Expenditure effect on budget share

*** = p < 0.10, ** = p < 0.05, * = p < 0.01

with fish is -0.1806 with an expenditure coefficient of 0.0004 all significant (at p < 0.05, p < 0.01 and p < 0.01 respectively). This indicates that the budget share of beef increased by 25 kobo with an increase in its own price, but decreased by 18 kobo with an increase in the price of fish. This increase in beef's budget against its own price conforms to the work of Taljaard *et al.* (2004) and Adetunji and Rauf (2012). Fish had own-price effect of 0.1058, cross-price effect of -0.1806 with beef and expenditure coefficient of 0.0003 which are significant (at p < 0.01, p < 0.10 and p < 0.01 respectively). This means that with an increase in the price of fish, its budget share increased by 11 kobo but decreased by 18 kobo with an increase in the price of beef. This is in line with the report of Yusuf (2012) who applied the LA/AIDS model in examining the effects of household's socio-demographic characteristics as well as price and expenditure elasticities of the share of meat and fish demand in the households' food basket in Oyo State, Nigeria. The Marshallian own and cross price elasticities of demand on the share of meat and fish in the households' food basket were computed, as well as the expenditure elasticity. The results showed that the demand for beef and fish in the study area was elastic while that of chicken was inelastic. The cross price elasticity showed substitutive relationship between fish and chicken while there was complementary relationship between beef and fish, then beef and chicken. The cross price elasticity also showed that beef and chicken were luxury goods in the study area while fish was a necessity good. This may suggest equal preference for the two meat types in the study area. Fish had expenditure coefficient of 0.0003 in the study area i.e. an increase in per capita income of respondents will lead to 03 kobo increase in its budget share. The result of fish having positive expenditure coefficient is consistent with the findings of Osho and Asghar (2004).

Edo state: With respect to Edo State, chicken had a budget share of -0.2253, cross price effect of 0.1938 with beef and expenditure coefficient of -0.0006 all significant (at p < 0.01, p < 0.05 and p < 0.01 respectively). The budget share of chicken decreased by 23 kobo with an increase in its own price but increased by 19 kobo with an increase in the price of beef. In as much as respondents would reduce chicken budget share to an increase in its own price, they rather would increase it to an increase in the price of beef. This may suggest more preference for chicken meat than beef.

The expenditure coefficient for chicken (-0.0006) connotes that an increase in the income of respondents resulted in 06 kobo decrease in the budget share of chicken meat. The cross price effects of chicken and fish on beef were 0.1938 and -0.1702 with significant levels of p < 0.01 and p < 0.05 respectively. The expenditure coefficient of beef was 0.0003 (p < 0.01). This simply indicates that beef's budget share increased by 19 kobo with an increase in the price of chicken but decreased by 17 kobo with an increase in the price of fish. This means that the price of chicken had more effect on the budget share of beef than fish. The expenditure coefficient of beef (0.0003), shows that an increase in the income of respondents resulted in 03 kobo increase in beef demand. This result of beef budget share decreasing with an increase in its own price is in consonance with that obtained in the work of Osho and Asghar (2004), where beef's price effect on beef budget share was -0.118. Whereas, the budget share of beef increasing with an increase in the price of chicken concurs with the result of Adetunji and Rauf

(2012) and Igwe and Onyekwere (2007). Fish had a budget share of 0.1401, cross price effect of -0.1702 with beef and expenditure coefficient of 0.0003, significant (at $p < 0.01$, $p < 0.05$ and $p < 0.01$, respectively). This means that for an increase in the price of fish, its budget share increased by 14 kobo but decreased by 17 kobo with an increase in the price of beef. The cross price effect was greater than its own-price effect in absolute terms, meaning that fish budget share responded more to increase in the price of beef than to increase in its own price. The expenditure coefficient of fish (0.0003) was same as that obtained in the entire sample, i.e. increase in its budget share with an increase in the income of respondents.

Delta State: With regards to Delta State, chicken had a budget share of 0.1939 which implies that chicken budget share increased by 19 kobo with an increase in its own-price. Chicken had a cross price effect of -0.2790 with beef ($p < 0.10$). This indicates that the budget share of chicken decreased by 28 kobo with an increase in the price of beef. For beef, it had a budget share of 0.5694, cross price effect of -0.2790 with chicken and expenditure coefficient of 0.1170 ($p < 0.01$, $p < 0.10$ and $p < 0.05$ respectively). The budget share of beef increased by 57 kobo with an increase in its own price but decreased by 28 kobo with an increase in the price of chicken. The increase in budget share as a result of increase in its own price out-weights the decrease as a result of increase in the price of chicken. This may suggest that households in Delta State preferred beef to chicken meat. This may be due to the fact that majority of households in Delta State raise poultry (especially chicken,) which means it is readily available to them, hence, preference to spend more on beef which is seldom available. Its expenditure coefficient indicates that as the income of respondent increased, there was increase in the budget share of beef by 12 kobo. The expenditure coefficient for fish was -0.1091 ($p < 0.05$); this indicates that its budget share decreased by 11 kobo with an increase in the per capita income of respondents in Delta State. The budget share of chicken increasing with an increase in its own price and decreasing with an increase in the price of beef agrees with the result of Osho and Asghar (2004), while the budget share of beef increasing with an increase in its own price and decreasing with an increase in the price of chicken corroborates the work of Taljaard *et al.* (2004), where similar results were obtained. This result of fish decreasing with an increase in the per capita income of respondents agrees with the work of Yusuf (2012), where the expenditure coefficient estimate of fish was -0.1964.

Conclusion

The present study concluded that aggregate demand for meat in the study area was jointly determined by factors such as own-price, cross-price and expenditure coefficient. For the purpose of predicting future demand for chicken meat in the study area, own-price and price of beef are the most important and reliable explanatory variables that determine per capita demand for chicken meat. In the case of beef, own-price and price of fish are the relevant variables while per capita demand for fish is determined by own-price and price of beef.

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