ANALYSIS OF DETERMINANTS FOR URBAN HOUSEHOLDS DEMAND FOR MEAT IN BAUCHI STATE, NIGERIA

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Abstract
Despite all the potentials of livestock production in Bauchi State, it is worth noting that much has not been done in determining the factors that influence the demand for livestock product especially at the micro (Household) level. Previous study focused on the analysis of the effects of socioeconomic characteristics of the households on the demand for major meat types in Bauchi State. However, this study deviated from the previous work as it assessed the influence of price and income on the demand for meat in Bauchi State. This constitute the gap in research that this study is designed to fill. In light of the above, it is therefore important to analyze the households demand for major meat types in Bauchi State Nigeria. Multi-stage sampling procedure was employed and 200 respondents were selected. The data collected were analyzed through the use of regression analysis. The results showed that the income elasticity`s of demand for beef, mutton, chevon and chicken were all positive and statistically significant at 1%, 1%, 5% and 10% respectively. Also the own price elasticity`s for beef, mutton and chicken were negatively related to their demand and significant at 5%, 5% and 1% respectively, while that of chevon, was positive and significant at 1% level. In, general, demand for meat is found to be positively related to the income level of the household heads. Thus, it was recommended that government and relevant stakeholders should give priority to the policies that will improve income and increase awareness of the people to the importance of meat to the health and wellbeing of individuals.

Key words: Analysis, Urban, Demand, Households, Meat

Introduction
Meat is the portion of animal flesh that is used for food. It is one of the most important product of agriculture and mainstream of the Nigerian economy. Also, it is one of the most nutritious animal product as it contains all the essential amino acids, vitamins, micro and macro nutrients and fats, which provide the necessary nutrients for individual`s wellbeing (Chinda *et al*., 2015).

Similarly, the increasing urban population growth in developing economies has necessitated rapid increase in the world demand for animal protein in the last few decades. In addition to increasing population growth, factors like improving technology, increasing income and awareness of the importance of meat to human, also affect the global demand for animal protein positively. Although, there is improvement in technology and incomes per capital, consumption of meat is inadequate especially in the less developed countries of the world because protein is the costly food item (Emokaro & Dibia, 2014).

Furthermore, attention has always been drawn to the imbalance between animal protein availability and the need for such protein in Nigeria. Most Nigerians found only affordable food from plants

sources which are mostly cereals that make them vulnerable to protein deficiency as a result of lower prices of plant based relative to the animal based food. It was however revealed that the availability and affordability of good quality meat and eggs is essential and most importantly precondition if the disastrous consequences of malnutrition or under nutrition must be curtailed. Therefore, the relative inadequacy of animal protein intake remains an inevitable point of concern to the policy makers in particular and Nigerians in general (Adah & Hope, 2017).

Moreover, the factors known to positively affect the consumption of beef in Maiduguri include household size, monthly income and monthly expenditure on food while negatively related to expenditure on substitute (Maina & Babagana, 2012). The declination effect of low income level, low population of animal in relation to human and low productivity of available animals resulted to both low intake and poor quality of the food consumed by the Nigeria`s households (Adah& Hope, 2017).

Similarly, the study conducted by Sani *et al*. (2017) captured the socio-economic factors affecting meat demand in Bauchi State. However, this study although was conducted in the same study area but it deviated from the above because it assessed the influence of price and income on the demand for meat in Bauchi State. Therefore, this study considered the following objectives it determined the influence of price and the consumers' income on the demand for meat in Bauchi State.

Materials and Method

Study Area
The study was conducted in some selected Local Government Areas of Bauchi State, Nigeria. The State is divided into three Agricultural Development Program Zones; The Western Zone, Northern Zone and Central Zone. The Western Zone has seven Local Government Areas; Bauchi, Toro, Dass, Bogoro, Tafawa Balewa, Kirfi and Alkaleri. Northern Zone include; Katagum, Zaki, Dambam, Giade, Jama`are, Gamawa, Itas Gadau, Misau and Shira. While Central Zone comprising of Ningi, Warji, Darazo and Ganjuwa making a total of twenty Local Government Areas. The State lies between $9^0 3$` and $12^0 3$` North of the equator and longitude $8^0 50$` to $11^0 0$` East of the Greenwich Meridian. The average high temperature in April is $36^0 c$, while the average low temperature in December is $12^0 c$. The population of the area was 4,653,066 out of which 2,369,266 were males and 2,283,800 were females according to the census (2006) this figure was projected to increase to 6,596,137 in 2019(NPC, 2006).

Sampling Technique and Sample Size
Multi-stage sampling procedure was used to select 200 meat consuming households in the state. The first stage involved the purposive selection of three Local Government Areas (Bauchi, Katagum and Ningi from Western, Northern and Central Zones respectively). The second stage involved the purposive selection of Bauchi, Azare and Ningi town from Bauchi, Katagum and Ningi Local Government areas respectively. The third stage was the proportionate sampling selection of four, two and two wards from Bauchi, Azare and Ningi Town respectively due to the fact that the towns consist of subgroups that are greatly different in number, giving rise to a total number of eight wards. The fourth stage was the proportionate sampling selection of 31, 30, 24, 26, 24, 20, 23 and 22 household heads from Makama A, Hardo, Dan`iya, Makama B, Nasarawa Bakin Kasuwa, Madangala, Ningi and Tiffi respectively, making a total of 200 households for the study.

Data Collection
The data for the study were obtained using primary source. The data were collected using, well-structured questionnaires that were administered to the respondents, with the assistance of trained enumerators in the study area. The questionnaires involved both open and close ended questions. The household heads were administered questionnaires and the appropriate information was recorded. Information on monthly income of the household heads was collected. The market prices of the meat types were collected from the major markets and the average market price computed. The quantities demanded for the meats were collected across the households and multiplied to get the monthly equivalent.

Analytical Techniques
The analytical tools used for the analysis were multiple regression models. They were used to determine the effects of income on the demand for major meat types and price elasticity`s of demand.

Also various functional forms were tested and the best fitted selected for the analysis. Of the four functional forms tried, namely; linear, exponential, semi-logarithm and double logarithm functions, the double logarithm gave the best result based on the number of significant variables, magnitude of the coefficient of determination (R^2), correctness of the signs of the regression coefficients and magnitude of the regression coefficients.

The price and income elasticity objectives were achieved using a multiple regression model. The demand for each major meat types depend on the

income, meat own price and price of other major meat types. This has been stated as:

$$Q_{db} = f(P_b, P_o, Y, \mu) \dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots\dots.1$$

Explicitly this can be expressed as:

$$LogQ_{di} = \beta_o + \beta_b LogP_b + \beta_m LogP_m + \beta_{cv} LogP_{cv} + \beta_{ck} LogP_{ck} + \beta_y Log\ Y + \mu \dots\dots\dots\dots\dots\dots\dots.2$$

Where:
Q_{di} = Quantities demanded for beef, mutton, chevon and chicken
β_o = Constant
P_b = Price of beef
P_m = Price of mutton
P_{cv} = Price of chevon
P_{ck} = Price of chicken
Y = Income of the household heads
β = the coefficients of the respective explanatory variables
μ = Error term

Note: Pb = Price of beef, Pm = Price of mutton, Pcv = Price of chevon and Pck = Price of chicken.

Results and Discussion

The Influence of Price on the Demand for Major Meat Types

Table 1 shows the price elasticity of demand for the various meat types. The coefficient of determination (R^2) for beef, mutton, chevon and chicken were found to be 0.8149, 0.8213, 0.8133 and 0.5379 respectively. Implying that 81%, 82%, 81% and 54% of the variation in the quantity demanded for beef, mutton, chevon and chicken were as a result of the changes in the independent variables in the model.

Table 1: Price Elasticities of Demand for Major Meat types

Variables R^2	Constant	Pb	Pm	Pcv	Pck	
Beef						
Coefficient	-2.5871	-0.2012	0.6449	0.8216	0.2729	0.8149
T- value	-3.28	-2.20	14.59	14.59	6.01	
P-value	0.001***	0.029**	0.000***	0.000***	0.000***	
Mutton						
Coefficient	-4.2633	0.3642	-0.1093	0.2449	0.1297	0.8213
T-value	-8.11	7.83	-2.11	2.54	3.07	
P-value	0.000***	0.000***	0.036**	0.012**	0.002**	
Chevon						
Coefficient	5.4464	0.6540	0.7965	0.2375	0.1719	0.8133
T-value	11.43	19.36	7.05	7.05	3.64	
P-value	0.006**	0.003**	0.018**	0.010**	0.000***	
Chicken						
Coefficient	-1.6041	0.2134	0.7151	0.3617	-0.6987	0.5379
T-value	-2.80	2.96	2.39	2.60	-3.66	
P-value	0.006**	0.003**	0.018**	0.010**	0.000***	

Source: Survey Data, 2017 ***= Significant at 1%, **= Significant at 5%, *= Significant at 10% level of probability

Beef Demand: The coefficient of own price elasticity of demand for beef was negative and also statistically significant at 5%. This implies that as the price of beef increases, the quantity of beef demanded decreases. Which conforms to the law of demand which states that as price of goods increases, the quantity demanded for such goods decreases (Quantity demanded is inversely proportional to price). The coefficients of cross price elasticity of the demand for beef with respect to the price of mutton, chevon and chicken were positive and statistically significant at 1% for the three meat types. This implies that mutton, chevon and chicken are substitutes to beef, in the sense that when the prices of mutton, chevon and chicken increase against the price of beef, consumers rationally shift their demand toward consuming beef. Maina (2017) reported a similar result where coefficients of own price for all the three meat products were significant at 1% but have negative coefficients. The coefficients of cross price elasticities of the demand for beef with respect to

the price of mutton (0.6440), chevon (0.8216) and chicken (0.2729) were positive and statistically significant at 1% for the three meat type's prices. This implies that mutton, chevon and chicken are substitutes to beef, in the sense that when the prices of mutton, chevon and chicken increase against the price of beef, consumers rationally shift their demand toward consuming beef. Maina (2016) revealed that factors that determine beef demand were its price, price of chevon, household income and household size at 1%, 10%, 1%, and 1% significant levels respectively. With regard to the sign of the coefficients, beef had positive relationship with chevon`s price which shows that chevon is a substitute to beef. Similarly, Olumide (2017) reported that own-price elasticity of demand for beef, chevon and chicken had the expected negative sign and obeyed the traditional demand theory.

Mutton Demand: With respect to mutton, the own price elasticity coefficient is also negative and statistically significant at 5% level and is consistent with theory of demand which states that the higher the price, the lower the quantity demanded. The cross price elasticity coefficients for mutton with respect to the prices of beef, chevon and chicken were positive and statistically significant at 1%, 5% and 5% respectively. This also indicates substitutability between mutton and the other meat types in the model this corresponds with the findings of Maina and Babagana (2012). This implies that mutton own price is one of the most important determinants of it demand and was found significant at 1% level. The cross price elasticities coefficient for mutton with respect to the prices of beef (0.3642), chevon (0.2449) and chicken (0.1297) were positive and statistically significant at 1%, 5% and 5% respectively. This also indicates substitutability between mutton and the other meat types in the model. On the contrary Olumide (2017) reported that mutton has positive own-price elasticity which suggests that an increase in its price increases its demand.

Chevon Demand: With regards to chevon's demand the results showed its own-price elasticity`s coefficient is positive and statistically significant at 1% level. This is quiet contrary to the traditional law of demand and a priori expectation. This may be due to the fact that, despite the fact that majority of the household heads do not consume goat`s meat, the few that consume are willing to offer more money for the chevon. Their ability to demand more of the chevon as the price increases rest on the following reasons; The characteristic flavor of the goat`s meat is admired

The Influence of Income on the Demand for Major Meat Types

by its consumers and they always want to get that satisfaction no matter the cost; Goats are very important sources of meat during festivities especially traditional festivals in some parts of Bauchi State. Also it could be abnormal demand because of the belief that goat`s meat is medicinal and does not cause heart related diseases as other meat types.

Hence, owing to the aforementioned reasons, an increase in the price of chevon would not discourage buyers from paying extra naira to satisfy it. The cross price elasticity of demand for chevon with respect to the price of beef, mutton and chicken were positive and statistically significant at 1% for all the meat types. This implies that beef, mutton and chicken are substitutes to chevon. On the contrary, the own-price coefficient of goat meat (-0.2560) in the goat equation indicates that a percent increase in the price of goat meat would decrease the household`s budget share for goat meat by approximately ₦0.26 (Twenty-six kobo) (Olumide, 2017). Another study revealed that the entire uncompensated price was negative and ranged from -0.73470 to -1.57224. Chevon in the low income group (-0.73470) was the least responsive to its price (in-elastic). This means that an increase in its price would have little effect on its demand. Thus, consumers in the low income group would have insignificant change in their demand, because the change in price would not be greatly felt. Own price for chevon in the middle income group (-1.57224) was the most responsive to its price and termed highly elastic as revealed by (Maina & Babagana, 2012).

Chicken Demand: According to table 1, the coefficient of determination R^2 for chicken was found to be 0.5379 which means that about 54% of changes in the quantity demanded for chicken were explained by the independent variables in the model. The own price elasticity of demand is negative and statistically significant at 1% level. This is in conformity with law of demand. The cross price elasticity of demand for chicken with respect to the price of beef, mutton and chevon were positive and statistically significant at 5% level for all the three meat types. This is similar to the findings of Toluwase and Kolapo (2017).This implies that households buy more of the other substitutes as the price of chicken rises. Also, chicken has the highest expenditure elasticity (2.0266). While beef and goat meat were gross substitutes, beef and chicken were gross complements.

The income elasticity of demand for beef, mutton, chevon and chicken were all positive and statistically significant at 1%, 1%, 5% and 10%

respectively. This implies that all the four meat items are normal goods and their demand respond positively with income level. Table 2 presents the income elasticities of demand for the four major meat types.

Table 2: Income Elasticity of Demand for Major Meat Types

Meat Types	Coefficient	Constant	P-values	T – values	R^2
Beef	0.6988	-2.587142	0.000	4.53***	0.8149
Mutton	0.9865	-4.263281	0.001	3.43***	0.8213
Chevon	0.1715	5.446412	0.008	2.66**	0.8133
Chicken	0.1398	-1.6041	0.052	1.96*	0.5379

Source: Survey Data, 2017 ***= Significant at 1%, **= Significant at 5%, *= Significant at 10% level of probability

The results indicated that the quantities demanded for the all four meat types are positively related to the household income. This implies that as household's income increases, the quantities demanded for the meat items also increase.

The coefficients of determination R^2 for beef, mutton, chevon and chicken are 0.8149, 0.8213, 0.8133 and 0.5379 respectively. This implies that approximately 81%, 82%, 81% and 54% of the variation in the quantities demanded for beef, mutton, chevon and chicken were explained by the independent variables in the model. The coefficients of income elasticity of demand for beef, mutton, chevon and chicken are 0.6988, 0.9865, 0.1715 and 0.1398 and statistically significant at 1%, 1%, 5% and 10% respectively. The magnitudes and signs of the coefficients of income elasticities categorized all the meat types as normal goods, because as households' incomes increase, the demand for beef, mutton, chevon and chicken also increase. This is in accordance to the findings of Maina *et al*. (2012) where household income was positively related to expenditure on ruminant meat demand at 1% level. This implies that the higher the income level, the higher the expenditure on ruminant meat. According to Maurice *et al*. (2015) the coefficient of monthly income was positive and statistically significant at 5% level indicating that as monthly income increases, the demand and consumption of meat also increases and therefore meat was identified as normal good.

Conclusion and Recommendations
This study found some noticeable conclusions. Firstly, the income elasticities of demand for beef, mutton, chevon and chicken were all positive and statistically significant at 1%, 1%, 5% and 10% respectively. This implies that all the four meat items are normal goods and their demand respond positively with income level. Secondly, the results further show that the own price elasticities of demand for beef, mutton and chicken were negatively related to their prices and were found significant at 5%, 5% and 1% respectively. While chevon, own price elasticity was found positive and

significant at 1% level. Finally, the cross price elasticities, coefficients were all found positive and significant at their various percentage levels.

Therefore, the study recommends the following policies;

I. That income level of the people in the state should be improved and raised to an optimum level.
II. Mass skills acquisition programs and job creation.
III. Provision of sound education which consequently widens the opportunities for better and well-paid job.
IV. Animal production should be encouraged in the state to ensure adequate supply of meat to the households so that supply and demand equilibrium position will be achieved to ensure good prices for the animal products.
V. To improve extension services and provision of certain important inputs to the farmers.

References

Ada, M. I. & Hope, E. U. (2017). Econometric analysis of demand for beef, fish and eggs in Dekina Local Government Area of Kogi State, Nigeria. *American Journal of Food Science and Nutrition Research*, **4**(4), 130-136.

Adetunji, M.O. &Rauf, M.O. (2012). Analysis of household demand for meat in Southwest Nigeria. *Global Journal of Science Frontier Research Agriculture and Biology*, **12** (1), 1-9.

Chinda, M.D., Umaru, S., Jongur, A.A. & Girei, A.A. (2015). Analysis of factors affecting meat demand in Michika Local Government Area of Adamawa State, Nigeria. *Journal of Plant and Agriculture Research*, **1**(1), 1-6.

Emokaro, C. O. & Dibia, O. (2014). Demand analysis for chicken meat, beef and fish among urban households in Edo and Delta States, Nigeria. *Journal of Applied and Natural Sciences,***6** (1), 239-245.

Ivanovic, S., Pavlovic, I. &Pisinov, B. (2016). Biotechnology in Animal Husbandry. The quality of goat meat and its impact on human health in Belgrade Serbia. *Journal of Biotechnology in Animal Husbandry,* **32**(2), 111-122.

Kisungwe, I., Engelmann, R. Salisali, B & Sigalla A. (2012). Commercialisation of Chicken Production and Marketing in the Central Corridor, Tanzania. Rural Livelihood Development Company.

Maina, B. Y. (2017). Empirical analysis of the determinants of meat products demand in Maiduguri, Borno State Nigeria. Unpublished Dissertation, Department of Agricultural Economics and Extension, University of Maiduguri, Borno State, Nigeria.

Maina, B.Y. & Babagana A. B. (2012). Determinants of ruminant meat demand in Maiduguri, Borno State, Nigeria. *Greener Journal of Agricultural Sciences,* **2**, 381-385.

Maina, B. Y., Iheanacho, A. C. & Babagana, K. (2012). Determinants of ruminant meat

Sani, R.M., Alhassan M.N.& Danwanka H.A. (2017). Analysis of households demand for major meat types in Bauchi State, Nigeria. *Journal of Farm Management Association of Nigeria,* **17**(1), 47-55.

demand among different income groups in Maiduguri, Borno State Nigeria. *Agris on-line Papers in Economics and Informatics*, 4, 91-98.

Maina, B. Y. (2016). Urban household demand function for beef, mutton and chevon in Borno State, Nigeria. Unpublished Dissertation, Department of Agricultural Economics and Extension, University of Maiduguri, Borno State, Nigeria.

Maurice, D. C., Salamatu, U., Jongur A. A. &Girei, A. A. (2015) Analysis of factors affecting meat demand in Michika Local Government Area of Adamawa State, Nigeria. Journal of Plant and Agriculture Research, **1**(1), 1-6.

NPC (2006).National Population Commission Official Census Figures, NPC, Abuja, Nigeria.

Olumide, A. (2017). ''Household demand for meat in Nigeria'' selected paper for presentation at the Southern Agricultural Economics Association`s 2017 Annual Meeting, Mobile, Alabama, February, 4-7 2017.

Toluwase, S. O. W. &Kolapo, A. (2017). Economic analysis of consumer demand for chicken meat in rural and urban households of Ondo State, Nigeria. *Global Educational Research Journa*l, **4**(3), 531-535.