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Households Demand Analysis For Processed Fruits In Abeokuta Metropolis of Ogun State, Nigeria

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Abstract

This study hypothesized that demand for for processed fruits is price inelastic in Abeokuta metropolis of Ogun State using Almost Ideal Demand System. Data were collected randomly from one hundred and twenty (120) respondents with the use of structured interview schedule. Data analysis revealed that 76.7% of the respondents were male while 77.5% were married persons. Average household size was 7.89 while average age was 45.75 years. Findings revealed that 10.8 % of respondents N35, 000 and N60, 000 while the average monthly expenditure on processed fruit was ₦ 3, 791.17.This study revealed that 72.5% of the respondents consumed orange, 55% banana, 30% pineapple, 23.3% apple, 10.8% pawpaw, 8.3% mango and 0.8% cashew on daily basis in various processed forms. The Almost Ideal Demand System (AIDs- model) used to draw inferences for the study showed that there exist an inverse relationship between household expenditure and the budget share of processed fruit. The result showed that demand for processed fruits is price inelastic implying that households are insensitive to changes in the price of processed fruits.

Key Words*: Budget share, Expenditure, Own- price Socio-economic Characteristics.*

Introduction

Fruit can be defined as ripened ovary of a plant containing the seed (Srivastava, 2007). Due to its high nutritive value, it makes a significant nutritional contribution to human wellbeing. Most fruits contain significant quantities of sugars and are high in vitamins such as vitamin A and C which are not abundant in the staple food of many tropical areas. Fruits have been significantly singled out in human nutrition for the supply of minerals and vitamins, some hormone precursors in addition to protein and energy (Taylor, 1999).

Both established and planned fruit and vegetable processing projects aimed at solving a very clearly identified development problem. This is that due to insufficient demand, weak infrastructure, poor transportation and perishable nature of the crops, the grower sustains substantial losses. During the post-harvest glut, the loss is considerable and often some of the produce has to be fed to animals or allowed to rot. Even established fruit and vegetable canning factories or small medium scale processing centres suffer huge losses due to erratic supplies. The main objective of fruit and vegetable processing is to supply wholesome, safe, nutritious and acceptable food to consumers throughout the year.

Fruit juice is the next best thing to fresh fruit, and can be packaged in aseptic,

easily transportable containers that are less susceptible to damage and have a relatively long storage life. Juice extraction and separation therefore open up new market opportunities for tailoring fruit products to modem consumer demands. In Nigeria, the availability of fruits is short-lived due to their seasonal and highly perishable nature. A larger percentage of the fruits are also consumed directly as they came from the orchards, due to lack of appropriate storage facilities, up to 30-60% losses are recorded annually during peak harvesting seasons. In order to minimize these losses, fruits must be processed in large quantities into various forms at peak seasons, to make them available even at off-season periods.

The yield from any fruit juice process depends on good solids handling. Removing the solid matter and pulp, and then clarifying the juice can control the colour, taste and overall quality of the end product (Olawale *et al*., 2007). About 20 million Nigerians, approximately 15 percent of the country's population of more than 133 million, constitute the target market for juice products. Consumption should increase as households begin to use products at home more frequently. The few large food processing companies have developed or increased production for local consumption and export to neighboring countries. New firms are reported to be investing in Tetra pak production lines. Small - scale manufacturers of bottled fruit drinks have also boosted capacity (USDA, 2005).

Apart from juices, fruits are processed to concentrates, pre-mix and salads. In whatever form, fruits contain valuable complements to diet, such as protein, calcium, iron and vitamins. Fruits have contributed to the development of the food drink industries as they serve as raw materials, thereby creating employment for people theta work in such industries. Fruits add variety, enjoyment and a sense of satisfaction with the diet because of their appealing colours, flavours and textures. Fruits also have great potentials for foreign exchange earnings. However with the increasing awareness on health and nutritional potential of fruit and encouragement of agro allied industries by Federal Government of Nigeria, people now consume fruits better than before whether in processed or raw form. Various fruits are eaten mainly in areas of production depending on availability and status of the people who can afford them.

Deaton and Muellbauer(1980a) introduced the Almost Ideal Demand System(AIDS) which satisfies a number of durable theoretical properties, and is very convenient to estimate. Estimation of the demand functions is very useful as they provide us with income(expenditure) and price elasticities. AIDS model has been used extensively in different areas. Gallet(2007) used AIDS model to study demand for higher education in the United States. He found out that demand is least responsive to tuition and income in the United States.

Hannan *et al*.,(2010) used a variation of the AIDS model of Deaton and Muellbauer(1980a) to determine the impacts of per capita total expenditure, food prices

and demographic variables on household demand for dairy products in Bangladesh. The budget shares are generally more responsive to per capita total expenditure than to prices. Family size and occupation of the household head have a significant impact on the household demand behaviour.

Huq and Arshad(2010) estimated demand elasticities for different food item in the context of Bagladesh using AIDS model with corrected Stone price index. The income elasticity of demand for cereal, meat and fruit were 0.51, 2.46 and 1.96 respectively.

Han and Wahl(1998) used a two-stage budgeting LES- LA/AIDS system to estimate rural household demand in China with special emphasis on changes in demand for fruit and vegetable commodities across different income groups. The own-price elasticity for food was found to be more elastic than that for clothing, housing, durable goods, and other items. Within the food group, price elasicities range from -1.042 to -0.019.

Nigeria is a subsistence agrarian economy that depends largely on imports to meet its basic food requirements. The country imported $2.5billion in food product in 2004 making her the largest single market for foreign agricultural products in Sub-saharan Africa. U.S. agricultural export to Nigeria base(mostly fruit juice concentrates and pre-mixed products) accounted for approximately $1.4 million worth of U.S. sales in 2004. In 2002, the government of Nigeria placed an import ban on a wide range of agricultural products to protect local industries and to conserve foreign exchange. The fruit industry producing far below capacity before the ban, increased from just 12% in 2002 to over 75% by 2004(Oyinkin,2005).

In view of the above, this study therefore uses AIDS model to analyse the demand for processed fruits in Abeokuta metropolis of Ogun State, Nigeria. Specifically, this study set out to;

1. identify the socio-economic characteristics of household heads.
2. investigate householdsô consumption pattern for processed fruits and
3. examine the factors influencing households demand for processed fruits in the study area.

Hypotheses of the study

i. Demand for processed fruits is price inelastic
ii. There is no significant relationship between the socio-economic characteristics of household head and the budget share of processed fruits.

Methodology

This project was carried out in Abeokuta metropolis, the largest city and capital of Ogun State in southwest Nigeria and is situated on the Ogun River, 64 miles north of Lagos by railway or 81 miles by water. It is situated at 7°9Nj4nJN 3°20Nj4nJE: 7°9Nj4nJN 3°20Nj4nJE, on the Ogun River; 64 miles north of Lagos by railway, or 81 miles by

water. Abeokuta metropolis has a total population of 593.143 people as at 2006. The original settlers of Abeokuta were of the Egba ethnicity, later some Yoruba came to the city, the Baptist and Anglican missionaries operated in the area in the 19th century. Abeokuta (a word meaning "under the rocks") dating from 1825, owes its origin to the in roads of the slave hunters from Dahomey and Ibadan, which compelled the village populations scattered over the open country to take refuge in among the rocks surrounding the city. Here they constitute themselves a free confederacy of many distinct groups each preserving the traditional customs rites and even the names of the original villagers. In 1893, the Egba United Government based in Abeokuta was recognized by the United Kingdom. In 1914, the city was made the part of the colony of Nigeria by the British (Canby, 1984;Wikipedia, 2011). Abeokuta metropolis has only (2) Local Government Areas namely Abeokuta South Local Government having itôs headquarter at Ake with 15 wards and Abeokuta North Local Government Area having its own headquarter at Akomoje with 17 wards.

Multistage random sampling technique was used to select the households. In the first stage the study area was which is made up of two local government areas is stratified into 2 based on local government areas . The second stage involved the random selection of 6 wards from the existing 15 in Abeokuta South Local Government Area and 7 wards from existing 17 in Abeokuta North Local Government Area (40% each) making a total of 13 wards. The third stage involved systematic selection of 10 households from each selected ward, making a total of 130 households. At the end of the data collection exercise, 120 copies of the interview schedule were found suitable for use in data analysis.

Primary data was used in this study. Necessary data were collected with the aid of a well structured interview schedule. Information was collected on socioeconomic characteristics of household head, household consumption pattern for processed fruits and factors affecting it.

Two main approaches were used in this study for data analysis. These are as follows:

Descriptive Analysis: This involved the use of frequency tables, percentages.

Almost Ideal Demand System (AIDS) model: This model was used for result description. AIDS model for Deaton and Muellbauer (1980b) was used to estimate statistical relationship between variables.

The AIDS model can be specified as

$$w_i = \alpha_i + \sum_j^n \gamma_{ij} \ln P_j + \beta_i \ln(\frac{x}{p}) + e_i \qquad (1)$$

where w_i = budget share of ith commodity

defined by $P_j Q_i / X$

P_j = price of jth commodity

γ_{ij} = estimated coefficient of prices

β_i = estimated expenditure coefficient

X = total expenditure on all commodities in the system

P = price index

Q_i = quantity demanded for the ith goods

The price index can be further defined as:

$$\ln P = \alpha_0 + \sum_k \alpha_k \ln P_k + \frac{1}{2} \sum_j \sum_k \gamma_{jk} \ln P_k \ln P_j \quad (2)$$

The price index makes equation 1 to be non-linear. In order to linearize it, the Stoneôs index was incorporated.

$$\ln p = \sum w_j \ln p_j \quad (3)$$

Homogeneity, symmetry, and adding up are respectively imposed on the system through the following parameter restrictions:

$$\sum_j \gamma_{ij} = 0; \gamma_{ij} = \gamma_{ji}; \sum_i a_i = 1; \sum a_{is} = 0; \sum \beta_i = 0; \sum \gamma_{ij} = 0. \quad (4)$$

Following Chalfant (1984) and Ahmed and Shams (1994), the Marshalian and Hicksian elasticities were computed from the estimated parameters of the Linear Approximation AIDS model (LAAIDS) in equation 4 as follows;

Marshalian (Uncompensated) Elasticities

$$\varepsilon_{ij} = -1 + (\gamma_{ij} / w_i) - \beta_i \quad \text{(own- price)} \quad (5)$$

$$\varepsilon_{ij} = (\gamma_{ij} / w_i) - \beta_i (w_j / w_i) \quad \text{(cross-price)} \quad (6)$$

The expenditure elasticity is derived as

$$E_i = 1 + \beta_i / w_i \quad (7)$$

Results and Discussions

Socio - Economic characteristics of Respondents

The socio economic characteristics of the respondents considered in the study are sex, age, marital status, educational qualification, family size and monthly income. The findings in table 1 showed that 76.7% of the respondents are male while 23.3% of the respondents are females. This implies that there are more male headed households in

the study area than female headed households. The data further showed that 7.5% of the respondents are less than 30 years of age while 4.2% are above 59 years. The remaining 90% aged between 30 and 59 years. Mean age was found to be 45.75years. This implied that most of the respondents are middle aged. Table 1 further revealed that 77.5% of the respondents are married; only 7.5 are single while 6.7 percent of the respondents are widowed. It can be deduced that most of the respondents are married with marital responsibilities. The result also revealed that 65.8 percent of the respondents have tertiary educational qualification, 20.8 percent have secondary school qualification while only 2.5 percent have primary education but 10.8 percent had no formal education. This implies that majority of the respondents are literate and should understand the importance of fruit consumption in human diet. The result also table showed family size distribution of respondents. The mean family size was found to be 7.89 members. Table 1 revealed that 48.3 percent of the respondents have total income between the ranges of ₦50,000-99,999, while while 4.2 percent both earn between ₦ 150,000- 199,999 and ₦ 200,000 - 249,999. The mean total income was found to be ₦ 113,174.28. This implies that the mean total income of ₦ 113,174.28 will be spend for the upkeep of an average family size of 7.89 for food, clothing, shelter and other expenses for the survival of the family.

Processed fruit consumption and expenditure pattern of the respondents

Table 2 revealed different types of processed fruit available to the respondents and their demand pattern on daily basis. It was discovered that 72.5 percent of the respondents demanded orange fruit juice on daily basis, 55 percent identified with banana, 30 percent for pineapple, 23.3 take apple juices on daily basis, 10.8 opted for pawpaw while 8.3 percent of the respondents claimed to consume mango fruit juice on daily basis. It could be clearly seen from the analysis that orange juice is a favourite of most of the respondents. The high daily demand for orange could be as a result of the fact that it was the earliest form of processed fruit that was introduced into the Nigerian market initially which is very rich in essential vitamins especially vitamin C.

The table showed that 31.7 percent of the respondents claimed to expend ₦ I0, 000- ₦ 19, 999 on food per month, 4.2 percent expended less than ₦ 10, 000 while 18.3 expended above N40, 000 per month on food. It was revealed that the average amount of money spent on food monthly by the respondents was ₦ 25, 404.17. From the food expenditure distribution table, it can be deduced that majority i.e. more than 50 percent of the respondents have their monthly food expenditure greater than the average food expenditure in the area.

The table further revealed the amount spent on fruit juice on monthly basis by the respondents. It showed that 30.8 percent of the respondents spent between ₦ 1500 and

₦ 2999 per month on fruit juice, while 6.7 percent of the respondents spent between ₦ 5500 and ₦ 6499 per month on fruit juice. On the average from the analysis, N3, 791.17 is being spent monthly on fruit juice in the study area. With an average of 3, 791.17 being spent on fruit juice monthly, it can be deduced that about 62.5 percent of the respondents spent below average on fruit juice while only 37.5 percent spent above average. This may be as a result of different income earning capacity of the respondents.

Almost Ideal Demand System

The demand equation for processed fruits were estimated using AIDS model without imposition of any restrictions. From the table, the test for homogeneity was carried out. The results of the tests showed that in the consumption of processed fruit, there was a significant violation of the homogeneity conditions. This result is in line with the findings of Deaton and Muellbauer (1980a), Ahmed and Shams (1994), Tsegai and Kormawa(2002) and Awoyemi *et al.,* (2006).The result of the analysis present in Table 3 shows the unconstraint parameter estimates. The Durbin ï Watson statistics was within the plausible region in Table 3. One can effectively say that the both the dependent and the independent variables have efficiently performed their role. The result using the budget share of processed fruit as the dependent variable shows that six (6) variables were found to be statistically significant at 1 % and 5% level of significance. The Six (6) significant variables are explained thus:

Gender of the household head: This variable was statistically significant at 5% level and has a positive sign. This implies that the budget share of processed fruit allocated to male is more than that of female.

Household size: This variable was statistically significance at 1 % level: It has a positive relationship with budget share of processed fruit. This implies that the budget share of processed fruit increases with an increase in household size.

There is a direct and significant relationship between the price of fruit juice(1%), price of snacks(5%) and the budget share of processed fruit while there is indirect and statistically significant relationship between the total food expenditure(1%), price of beer(5%) and the budget share of processed fruit. . In other words, the budget share of processed fruits increases with an increase in the price of fruit juice and price of snacks The indirect relationship implies that the budget share of processed fruits decreases with an increase in price of beer and total food expenditure.

Own price and Cross price Elasticity

Table 4 shows the estimates of own price elasticity for processed fruit juice. The estimate of own price elasticity was less than one and negative which conform to the law of demand. Processed fruit has inelastic own price elasticity. The negative sign is in line with earlier findings by Han and Wahl (1998) who reported -1.011 for China rural household, Huang and Lin (2000) who reported -0.65 own-price elasticity for fruit from household data, Brown and Lee (2002)(-0.18) and Dong and Lin (2009) who obtained -0.52 own-price elasticity for fruit from low-income Americans .This indicates that households in Abeokuta metropolis are insensitive to changes in the prices of processed fruit because of its essentiality in their diet. The own-price elasticity of processed fruits was-0.68, meaning that an increase in the price of processed fruits by 10percent would decrease its consumption by 6.8 percent.

Also from the cross price elasticity, beer, water, wine and snacks all have a positive signs implying a substitute relationship, there was no complementary relationship that existed between the demand for processed fruit in the study area.

Expenditure elasticity

From table 5, expenditure elasticity of processed fruit is positive suggesting that processed fruits are normal goods whose consumption will increase with increasing total expenditure on processed fruits (see also, Han and Wahl, 1998). The expenditure elasticity of processed fruit is less than one. Processed fruits are expenditure inelastic. The consumption of processed fruit will decline as per capita income increases. According to the AIDS setting, the sign of the coefficient for the expenditure variable establishes whether a product group is a luxury good or a necessity. These revelations suggest that processed fruits are necessities. This implies that as the price of processed fruits increases, consumers tend to spend proportionately less on it.

Table 1: Socioeconomic Characteristics Distribution of Respondents

Gender	Frequency	Percentage
Male	92	76.6
Female	28	23.3
Age (years)	**Frequency**	**Percentage**
<30	7	5.8
30-39	20	16.7
40-49	45	37.5
50-59	43	35.8
>59	5	4.2
Mean	45.75	
Standard deviation	9.68	

Marital status	**Frequency**	**Percentage**
Married	93	77.5
Single	9	7.5
Widow	8	6.7
Divorced	7	5.8
Separated	3	2.5

Educational status	**Frequency**	**Percentage**
No formal education	13	10.8
Primary education	03	2.5
Secondary education	25	20.8
Tertiary education	79	65.8

Family size	**Frequency**	**Percentage**
<5	24	20.0
5-9	59	49.2
10-14	36	30.0
15 and above	1	0.8
Total	120	100
Mean	7.89	
Standard deviation	2.76	

Total income (N)	**Frequency**	**Percentage**
<50,000	25	20.8
50,000 - 99,999	58	48.3
100,000 - 149,999	21	17.5
150,000 - 199,999	5	4.2
200,000 - 249,999	5	4.2
>250,000	5	8.3
Mean	113174.30	
Standard deviation	271680.10	
Total	**120**	**100**

Source: Field Survey, 2011**.**

Table2: Processed fruit consumption and expenditure pattern distribution of respondents

*Processed Fruit	Frequency	Percentage
Orange	87	72.5
Banana	66	55.0
Pineapple	36	30.0
Apple	28	23.3
Pawpaw	13	10.8
Mango	10	8.3

Amount (N) on food	**Frequency**	**Percentage**
<10,000	5	4.2
10,000 - 19999	38	31.7
20,000 - 29999	30	25.0
30,000 - 39999	25	20.8
>40,000	22	18.3
Total	**120**	**100**

Amount on processed fruit (N)	**Frequency**	**Percentage**
<1500	13	10.8
1500 - 2499	37	30.8
2500 - 3499	25	20.8
3500 - 4499	10	8.3
4500 - 5499	10	8.3
5500 - 6499	8	6.7
>6500	17	14.2
Total	**120**	**100**

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* Multiple were allowed
Source: Field Survey, 2011.

Table 3: Unconstrained parameter estimated and test of homogeneity for the demand for processed fruits

commodity	Constant	Fruit juice	Beer	Wine	Water	Snacks	Gender	Household size	Expenditure	R^2	DW
Fruit juice	0.588** (16.301)	0.037** (6.876)	-0.008* (-2.118)	0.001 (0.263)	0.004 (1.055)	0.008* (2.332)	0.13* (2.435)	0.027** (2.850)	-0.092** (-52.618)	0.973	1.888

Source: Field Survey, 2011. NOTE Value in parenthesis represents t-values
*Represents significant at 5% level of significance ** Represents significant at 1% level of significance

Table 4: Own price and cross price elasticities

Commodity	Fruit juice	Beer	Wine	Water	Snacks
Processed fruit	-0.68	0.004	0.03	0.04	0.093

Source: Field survey, 2011.

Table 5: Expenditure Elasticity of processed fruit consumption

Commodity	Expenditure elasticity
Processed fruit	0.44

Source: Field survey, 2011.

Conclusion

It can be concluded based on these findings that processed fruits as a commodity is a well established food items among the inhabitants of Abeokuta metropolis with a regular budget to it and that the budget does not fluctuate with increase in household expenditure. Households in Abeokuta metropolis are insensitive to changes in the price of fruit juice because it is price inelastic as a result of the aforementioned reasons.

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