

Analysis of Socio-Economic Determinants of Apple Fruits (*Chrysophyllum Albidum*) Demand among Consumers in Mubi Metropolis, Adamawa State, Nigeria

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Abstract: The demand of apple fruits has experienced a rapid increase in recent years. While several researches have been conducted in attempt to address the production inadequacies, very minimal has been done towards solving the consumption patterns/behaviour and related issues. This study therefore, analysed the socio-economic characters that determined apple fruits demand among consumers in Mubi Metropolis, Adamawa State, Nigeria, as an effort towards filling this gap. A total of 81 apple fruits consumers were selected randomly from road side apple stalls for the study. Primary data were collected through structured questionnaire and supplemented by oral interviews and group discussion. Descriptive statistics and multiple regression analysis were used in realising the objectives. Results revealed that majority (56.79%) of the apple fruits buyers were males within an age range of 21-30 years (37.04%) and singles (41.98%). While a larger proportion (37.04%) were graduates, apple fruits buyers with household sizes of 1-5 members accounted for the majority (74.07%). On the occupation basis, civil servants were 43.21%, and mainly purchased their apple fruits from the road side stalls (55.56%). Analysis of multiple regression showed that the demand for apple fruits was largely determined by price of the crop (4.2556) and income of buyers (4.2142) of which both coefficients were significant at $P < 0.001$. Consumption pattern revealed taste as the most (61.73%) preferential factor to demand of apple fruits, with evening period as the main (62.97%) time of eating the crop. Major constraints observed among the buyers were high price of apple fruits, poor quality of the crop and sizes of same, among others. It's therefore, concluded that educated single male respondents were the majority of apple fruits consumers in the study area, and the main determinants of demand among buyers were the price of apple fruits and income of the respondents. Drawing from the findings, it's recommended that both the public and private sectors should direct efforts toward providing apple fruits growers with adequate inputs so as to produce in glut in order to lower the prices. Also, researches should be tailored in the direction of improving the sizes of apple fruits through breeding, and train more agriculture extension officers to enlighten growers and consumers of the appropriate methods of storage.

Keywords: Adamawa, Apple, Consumption, Demand, Fruits, Nigeria

1. Introduction

Apple, otherwise scientifically referred to as *Chrysophyllum albidum* is a fruit of a family *Sapotaceae* (Agbelade and Onyekwelu, 2012). Although popularly known as Africa star apple, Onyekwelu and Stimm (2011) reported that it is primarily a forest tree species that occurs in diverse ecological zones in Nigeria, Uganda, Niger Republic, Cameroon and Cote d'Ivoire. It is a seasonal crop that is produced between December and April. Of recent, noted Onyekwelu and Stimm (2011), the fruit has been accepted as a crop of commercial value as a result of its recognition by people as fruit of high nutritive importance in Nigeria and other countries in West Africa.

Globally, the production and effective marketing of Africa star apple are being influenced by several factors. While Ames (2001) emphasized the role of location and farming systems in the production and demand of apples in the western and eastern United States, Noonari *et al.* (2015) reported the profitability of apple orchards in District Mastung, Pakistan, as a result of climatic advantage that warrant growers to produce highly coloured of the fruit which is highly demanded in the market. Vossen (2012) observed that there was an enlarged market for organically grown apples in California after a programme that highlighted the potential negative health effects of chemicals applied to the fruit.

However, Bolanle-Ojo and Onyekwelu (2014) attributed factors like fruit taste and size as major determinants of demand of *C. albidum* in rainforest and savannah ecosystems of Ondo State in Nigeria. But to many middle income and highly placed Nigerians, eating of apple fruits is associated with symbol of being rated at the apex of the society and therefore, an indication of good living, specifically because of its price. Be that as it may, the production of *C. albidum* in Nigeria is on the increase. In fact, several authors (Ehiagbanare, 2007; Onyekwelu *et al.* 2011; John *et al.* 2013; Agbelade & Onyekwelu, 2015) have noted that among the non-timber forest products in the country, apple fruits production is at the fore in providing sustainable livelihood support to the people. Similarly, the distribution of the crop is on the high side, as this is evidenced by its presence in virtually all the Local Government Area (LGA) headquarters of the federation.

Of these forest resources in Nigeria and specifically in the southern part, Ehiagbanare (2007) stated that the most preferred fruits are that of *C. albidum*. In spite of the huge nutritive value (Agbelade & Onyekwelu, 2012; Aworh, 2015; Ugwu & Umeh, 2015) of this golden fruit and the economic importance, the demand among consumers is very low. Several studies (Oyebade *et al.*, 2012; Muraki *et al.*, 2013; Ibe & Akachuku, 2015) have been conducted in the areas of production and chemical constituent of this fruit with remarkable success. But paucity of information exists in the field of economic aspect of this crop, and particularly the socio-economic implication in relation to demand among the consumers.

With respect to the above situation, this study, the analysis of socio-economic determinants of apple demand among consumers in Mubi Metropolis, Adamawa State, Nigeria, is an attempt towards unveiling additional information to the little literature for the purpose of making more knowledge to humanity. In doing this, the research will attempt to answer the following questions: What are the socio-economic factors influencing demand of apple fruits among consumers in the study area? What are the constraints associated with apple fruits consumption in the area surveyed?

This study in Mubi Metropolis which is also one of the LGA headquarters in the Federal Republic of Nigeria will provide the basis for assessing the socio-economic factors that influence the demand of this economic fruit with the hope that immense information would be unveiled for all and sundry.

2. Research Methodology

2.1 The Study Area

Based on Adebayo's report of 2004, Mubi Metropolis is composed of two Local Government Areas (LGAs) namely, Mubi-north and Mubi-south, and lies between latitudes 10° 05' and 10° 30'N of the equator and between longitude 13° 12' and 13° 19'E of the Greenwich meridian. The area has a landmass of 192,307 Km² with total population of 260,009 people (NPC, 2006). It is bordered by Hong, Maiha, Michika LGAs and the Cameroon Republic in the west, South and East, respectively.

Having regarded as the commercial nerve center of the State due to influx of business people from the Cameroon Republic, Niger Republic, Chad, and other neighbouring states in Nigeria, the major occupation of the people is farming. However, sideline economic activities that include trading, especially in cattle and small ruminants, grains (cowpea, maize, rice, and sorghum), hides and skin, fruits and vegetables, among others, are widely practiced.

2.2 Sampling Techniques and Data Collection

Mubi Metropolis was purposely selected because of the concentration of apple fruits sellers in the area as the headquarters. Since the apple fruits buyers are found at the sellers' stalls or designated points of sales at strategic locations in the metropolis, an accidental sampling method was applied in selection of the consumers. A total of 40 selling points (stalls) were identified for the study. Four trained enumerators were engaged in sourcing for the data. Of the 125 respondents encountered, 81 provided adequate data through the use of questionnaire occasionally supplemented by interview sessions and group discussions. Primary data were specifically collected on the socio-economic characteristics of the apple fruits buyers and other variables that include age, gender, marital status, household size, income, level of education, occupation, price of apple fruits, and price of substitutes. Secondary information were obtained from relevant Journals, Bulletins, books and State published bills.

2.3 Data Analytical Techniques

Both descriptive and inferential statistics were used in analysing the data. Descriptive statistics which include percentage, frequency distribution and mean were applied to achieve the socio-economic aspect, whereas multiple regression analysis was used to realise the effects of the socio-economic characteristics of the buyers on demand of apple fruits. The model is implicitly specified as below:

$$Y = f(X_1; X_2; X_3; X_4; X_5; X_6; X_7; X_8; X_9; e) \dots\dots\dots (1)$$

Where:

Y = demand of apple fruit

X₁ = Price of apple fruit (Naira)

- X₂ = Price of substitute (₦)
- X₃ = Gender of buyer (1 for male; 0 otherwise)
- X₄ = Age of buyer (Years)
- X₅ = Marital status (1 for married, 0 otherwise)
- X₆ = Level of education (Years)
- X₇ = Household size (number)
- X₈ = Occupation (1 for civil servant, 0 otherwise)
- X₉ = Income of consumer (₦)
- e_i = The error term

The above was applied to three (3) functional forms namely Linear, Semi-Log and Double-Log (Cobb-Douglas) in order to compare the fitness to select the best result, in which the Double-log was chosen as the lead equation. These are explicitly stated as:

Linear function –

$$Y = b_0 + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + b_5X_5 + b_6X_6 + b_7X_7 + b_8X_8 + b_9X_9 + e_i \dots\dots\dots (2);$$

Where b_0 is a constant term and the b_i s are the parameters to be estimated and can be interpreted directly as the Marginal Value Products (MVP), and X_1 - X_9 as earlier defined.

Semi-log function -

$$Y = \ln b_1 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_8 + b_9 \ln X_9 + e_i \dots (3);$$

Double-log function –

$$\ln Y = \ln b_0 + b_1 \ln X_1 + b_2 \ln X_2 + b_3 \ln X_3 + b_4 \ln X_4 + b_5 \ln X_5 + b_6 \ln X_6 + b_7 \ln X_7 + b_8 \ln X_8 + b_9 \ln X_9 + e_i \dots (4).$$

2.4 Results and Discussion

This section of the study presents and discusses the findings in four segments namely, the summary of the socio-economic characters of the apple fruits buyers, effects of these characters in determining demand of apple fruits, the consumption pattern and the constraints associated with the apple fruits demand in the area surveyed.

The finding in table 1 shows distribution of apple fruits buyers according to gender/sex in the area studied. It indicates that majority (56.79%) of the respondents were males, with a total of 43.21% representing the female buyers. Inferring from this results, it could be stated that male buyers formed a dominant chunk of the population of those that buy apple fruits in Mubi Metropolis, thereby making gender a significant factor. This was reflected in Rani's (2014) study of consumer behaviour in which the author classified factors that influence buyer preferences into four namely cultural, social, personal and psychological factors, with gender as a main determinant. However, although Shashikiran and Madhavaiah (2015) specifically streamlined factors that influence buyer behaviour to socio-economic, gender was not a significant variable in determining buying of organic food products in Bangalore City,

as their report depict. The variation in these findings pertaining gender would therefore, necessitate further probe before making a concrete affirmation.

Table 1: Distribution of apple fruits consumers based on gender in the study area

Variable	Frequency	Percentage (%)
Male	46	56.79
Female	35	43.21
Total	81	100.00

Source: Computed from field data (2016)

The distribution of apple fruits buyers based on occupation is shown in table 2. While a larger proportion (43.21%) of the respondents was accounted for by civil servants, a total of 30.87% apple fruits buyers were business personalities. Of the remaining buyers, 17.28% were unemployed and 8.64% formed a meagre proportion of farmers. These findings implied that the bulk (74.08%) of the apple fruits buyers were income earners within the study area.

Table 2: Distribution of apple fruits consumers according to occupation in the study area

Occupation	Frequency	Percentage (%)
Civil servant	35	43.21
Business	25	30.87
Farmer	07	8.64
Unemployed	14	17.28
Total	81	100.00

Source: Computed from field data (2016)

Table 3 indicates a summary statistics of the quantitative variables pertaining the apple fruits buyers in Mubi Metropolis, Adamawa State, Nigeria. A total number of 25 apple fruits was the maximum bought by an individual buyer per month, with a mean of 13 and a minimum of 5. With an average fruits of 13 bought per month per individual/household, it is an indication that apple is rarely consumed among the communities in the Metropolis surveyed. Also reported in table 3 is the amount spent on buying of apple fruits per month in the study area. Cumulatively, a maximum sum of ₦4800.00 was spent within a month for buying of the fruits by an individual customer or household, with a mean sum of ₦1869.14 and a minimum of ₦500.00. Given a scenario which placed majority of the population of the entire locality surviving on an income of below US\$1 per day per individual, the stated expenditure could be considered absolutely significant.

Prices of substitutes which include oranges, banana, water melon and sweet melon are also reflected in table 3. The result shows a mean price of about ₦104.00 for a unit of these fruits mentioned, and sum of ₦10.00 only as the minimum. The maximum price for a unit of these substitutes was ₦450, implying that although there was a shortfall in price compared to apple fruits, there was still slight preference in

demand for the latter. In other words, the prices of the close substitutes could not actually affect the buyers' choice for apple fruits.

Gregoire (2003) documented the impact of overall physiological aging on consumer behavior, and the consequences of sensory aging on the capability to perceive communication. And concluded that these biological changes are likely to almost interfere with the consumer behaviour. The result in table 3 indicates that youths (34 years) formed the mean age of apple fruits buyers in the Metropolis surveyed. While the maximum age for the buyers was 51 years, teenagers (19 years) recorded the minimum age for the personalities of the apple fruits buyers. The implication is that apple fruits are largely consumed by gainfully employed youths in the area.

Table 3: Summary statistics of quantitative variables studied on apple fruits consumers in Mubi Metropolis (n: 81)

Variable	Min.	Max.	Mean	Std. Deviation
Qty. of apple demanded	05	25	13	5.5507
Amount spent on apple fruit(₦)	500.00	4800.00	1869.14	1029.43
Prices of substitutes (₦)	10.00	450.00	103.77	106.14
Age of consumer (yrs.)	19.00	51.00	34.00	8.0315
Level of education (yrs.)	6.00	23.00	17.00	3.9971
Household size	1.00	18.00	4.00	2.9861
Monthly income (₦)	12,000.00	179,500.00	47,162.00	36568.46

Note: US\$1 = ₦420

Source: Computed from field data (2016)

Level of education and income level of an individual or household are said to be the only main variables that have great influence on consumers' response to products offer (Waheed *et al.*, 2014). The authors argued that although both economic and marketing theories posit that income plays a pivot role in consumers' behaviours toward acquisition of products, marketers leaped a step further to add that there might be other determinants rather than just income as a single factor. Be that as it may, the fact still remains that income exercises a leading role. This is reflected in table 3. The latter shows that the mean income of those that buy apple fruits in the Metropolis was ₦47,162.00 per month. The maximum earning individual/household was placed at ₦175,500 per month, with a minimum of ₦12,000 only, implying that majority of the apple fruits buyers within the study area were middle income earners. Similarly, the finding in table 3 indicates the level of education of the buyers. A total of 17 years was the mean period spent in the pursuance of western education, with 6 and 23 years as the minimum and maximum, respectively. This shows that apples as agricultural crops are elitist fruits in Mubi Metropolis.

Economic theory posits that the real household disposable income relates to spending on per head. In other words, there seems a strong correlation between the disposable income of a household and the stream of its expenditure. This is evidenced in a survey conducted by SBJ (2008) in which it was established that the types of goods and services households spent their income on were heavily affected by characters that included number of household members, among others. In the table 3, the mean

number for households was 4, indicating a relatively fewer family members which could afford the group the possibility of tilting towards superior products, given an average income and holding other relative variables constant: apple fruits regarded as such specialty crop in the area. However, the maximum number recorded for a household was 18, with an individual (1) as the minimum. The high number of persons observed in a given household in the study area could be associated with the nature of the culture of people in northern Nigeria that permits polygamous family settings.

Table 4: Distribution of apple fruits buyers according to source of purchase in the study area

Criterion	Frequency	Percentage (%)
Super market	04	4.94
Normal market	32	39.51
Road side stall	45	55.56
Total	81	100.0

Source: Computed from field data (2016)

The sources of purchase of apple fruits by the buyers is being captured in table 4. The result shows that about 56.00% of the respondents, signifying the majority, bought the fruits from the road side stalls. This was followed by a total of 39.51% who patronised normal organised township markets for the crop, and 4.94% accounted for those buyers that purchased apple fruits from super markets.

Table 5: Result of regression analysis indicating socio-economic determinants of apple fruits demand among consumers in the study area (n: 81)

Variable	Coefficient	Standard Error	t-Values	Level of Significance
Constant	-61.827	5.9184	-10.45	0.000
X ₁	4.2556	.7231	5.88	0.000 ^{***}
X ₂	.0076	.2610	0.03	0.977
X ₃	-1.4507	.8929	-1.62	0.109 ^{**}
X ₄	.3590	1.7555	0.20	0.893
X ₅	-.8684	1.6463	-0.53	0.599
X ₆	-.6779	1.0318	-0.66	0.513
X ₇	.8266	.6566	1.26	0.212
X ₈	-.0267	.9843	-0.03	0.978
X ₉	4.2142	.5840	7.22	0.000 ^{***}

Adjusted R² = 0.843

Note: ^{***} = Significant at P < 0.001; ^{**} = P < 0.05

Source: Field survey (2016)

In other to determine the major socio-economic factors that influenced apple fruits buyers' behaviour in the study area, a multiple regression analysis was employed. The findings in table 5 revealed that the entire independent variables included in the model appropriately explained the variations in the buyers behaviour to demand of apple fruits as indicated by the value of R² (0.843). In other words, 84.3% of the

variation observed in the consumers' behaviour of apple fruits was as a result of the independent variables. Specifically, the price of apple fruits (X_1) with coefficient of 4.256 and level of income of buyers (X_9) with coefficient of 4.214 which were both significant at $P < 0.001$, were the main determinants of demand of the crop among the consumers. The positive signs of both the coefficients imply that a unit increase in these variables would lead to the increase in demand by the observed values in each variable.

Although economic theory posits that the higher the price of a commodity, the less disposed consumers would be in demanding such product, this would only hold for normal goods. For superior or ostentatious goods, the reverse is the case. Meaning, the higher the prices of such products, the more buyers demand for them. And since apples are considered specialty fruits, buyers still demand for the crop regardless the rise in prices. However, income as a predictor variable in the model also plays a significant role. Noticeably, from the findings in table 3, it could be seen that the larger chunk of the buyers were middle income class, indicating that as the income increases, so would be the tendency to increase the buying of apple fruits.

Table 6 shows the reasons and time for the consumption/purchase of apple fruits in the area surveyed. Majority (76.54%) of the respondents bought apple fruits mainly due to request by female partners (wives, mistresses, sisters and friends). In other words, although the actual buying was effected by males, but the consumption proper were by the females. On further probing, it was discovered that elite women consider apple fruits as good skin tonner, and therefore, prevailed on their male partners to make such buying. This is followed by a group of buyers (67.90%) who found the flavour of apple fruits irresistible. The third group of buyers who said the taste of the fruits was the major reason for consumption of the crop accounted for 61.73%. Colour and shape of apple fruits as reasons for the consumption of the crop recorded 49.38% and 12.35%, respectively.

Table 6: Distribution of apple fruit consumers according to reason and time of consumption /purchase in the study area (n: 81)

Criterion	Frequency	Percentage (%)
Reason of consumption/purchase*		
Taste	50	61.73
Flavor	55	67.90
Color	40	49.38
Shape	10	12.35
Request by female partners	62	76.54
Time of consumption*		
Morning	20	24.69
Afternoon	35	43.21
Evening	65	80.25

*Multiple responses were recorded

Source: Field survey (2016)

The time of consumption of apple fruits in Mubi Metropolis is also reflected in table 6. The results in the latter indicate that majority (80.25%) of the buyers consumed apple fruits in the evenings, with about 43% consuming the fruits in the afternoons and a total of 24.69% eating the fruits in the mornings. This might not be unconnected with the late arrival of males (main buyers) home, and since female partners are mostly at home, there couldn't have been the best period than the evenings.

The problems experienced as consumers of apple fruits are shown in table 7. Prominent among all was the price of the crop which was considered expensive by 62.86% (1st rank). The quality of the crop ranked 2nd by 46.91%. These were the category of buyers who formed the perception that most apple fruits that are produced locally are of low quality, and therefore, would not settle for anything less than imported. The 3rd and 4th ranks of the constraints were size and storage of the apple fruits, respectively. Consumers reported that most apple fruits produced in the country are smaller in sizes and therefore, discourage buyers in patronising sellers of such fruits.

Table 7: Constraints associated with consumption of apple fruits based on rating in the study area (n: 81)

Constraint	Frequency	Percentage (%)	Ranking
Price/Expensive	51	62.96	1st
Storage	14	17.28	4th
Quality of apple	38	46.91	2nd
Size	22	27.16	3th
Colour	12	14.81	5th

Note: Multiple responses were recorded.

3. Conclusion

It could be drawn from the findings of this study that male educated persons within youthful age formed majority of apple fruits buyers in Mubi Metropolis, Adamawa State, Nigeria, with civil servants accounting for the larger proportion. While a larger chunk of the consumers bought apple fruits from the road side stalls and eat same mostly in the evenings, the major determinants of demand of the crop among buyers were the income and price of the fruits. Prominent setbacks experienced by consumers were high price of apple fruits, poor quality of the crop and sizes of same, among others.

4. Recommendation

Drawing from the results, it's recommended that both the public and private sectors should direct efforts toward providing apple fruits growers with adequate inputs so as to produce in glut in order to lower the prices. Also, researches should be tailored in the direction of improving the sizes of apple fruits through breeding, and then train more agriculture extension officers to enlighten growers and consumers of the appropriate methods of storage.

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