ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 13 No. 3
June 2013
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

DEMAND FOR NON-ALCOHOLIC BEVERAGES AMONG URBAN HOUSEHOLDS IN SOUTHWEST, NIGERIA

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ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 13 No. 3
June 2013
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

ABSTRACT

This study examined the roles of income, prices and household demography in household demand for non-alcoholic beverages (NABs) in two cities – Abeokuta and Ibadan in Southwest Nigeria. The study was based on primary data obtained from a cross-section of 407 households (211 from Abeokuta and 198 from Ibadan) drawn by multistage sampling technique across six Local Government Areas (LGAs) and 60 National Population Commission (NPC) enumeration areas (EAs). A structured questionnaire was used to collect data on households NABs expenditure, income, prices and other relevant socio-economic variables. The data were analysed within the framework of a linear approximation of an Almost Ideal Demand System. The study found that an average household, consisting of five (5) members, expended an average ₦5, 235.89 per month on NABs (approximately US$34.21 at N153.06/US$1 exchange rate in 2010). The bulk (67%) of the NABs expenditures were devoted to purchase of dairy products (36%) and cocoa-based products used in preparing chocolate drinks (31%). The estimated income elasticity of demand for the six categories of NABs studied were positive while all the own price elasticity of demand were negative. Demand for dairy products and cocoa based drinks were found to be price elastic, while those of carbonated drinks, malt drinks, fruit juice and other NABs were price inelastic. Increase in education of the household heads was found to be associated with significant increase in the budget shares of dairy products ($p<0.01$) and fruit juice ($p<0.10$), but a significant reduction in budget shares of cocoa-based products ($p<0.05$), carbonated drinks ($p<0.01$) and malt drinks ($p<0.05$). The study concludes that policies aimed at promoting increased demand and healthy choices of NABS must pay some attention to raising real income and increasing level of education among the citizenry. Profitability of business enterprises involved in dairies and cocoa-based products would also be better enhanced if the firms adopt cost saving strategies as against price hikes in a bid to enhance performance.

Key words: Demand, Non-Alcoholic Beverages, LA-AIDS model

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INTRODUCTION

Consumption of non-alcoholic beverages (NABs) either in the form of a tea/coffee drink taken with or without milk, or a fruit juice, non-alcoholic wine, chocolate drink, carbonated drink, or any of several other food drinks containing less than 0.5% alcohol, has been a basic form of refreshment among human societies across all ages and civilisations. Today, NABs are not just providing consumers with the basic refreshment function: many products are now available for mood enhancements, satisfaction of sweet indulgences, nutrient fortification and for celebration of specific social occasions [1].

Non-alcoholic beverages are widely recognised for their various contributions to household food and nutrition in general, and specially, for their role in body hydration [2]. Some NABs are rich in essential amino acids, minerals and vitamins, and are therefore commonly supplied in many programmes targeting nutritional enhancement of households [1, 3]. Milk is particularly rich in protein, calcium and vitamin D [2], with each 1-ounce reduction in milk consumption by a child causing calcium intake to be reduced by 34 milligrams [4]. Fruit and vegetable based juices are important contributors of vitamins (C, folate), minerals (potassium, magnesium) and dietary fibre [2]. Increased consumption of these NABs is thus, recommended as parts of a balanced diet [5, 6] as well as to lower the risk of some chronic diseases [6, 7]. Sugar sweetened NABs, including cocoa based and carbonated drinks are rich in easily digestible dietary energy that could prove useful in meeting dietary energy needs of children in poor households. There is conflicting evidence in literature, however, that suggests that excessive consumption of some NABs, specifically, sugar sweetened beverages and high fat dairy products, may be linked with some health challenges such as obesity [8 – 11].

In Nigeria, consumption of fermented (non-alcoholic) beverages was put at 159.85g/person/day in 2007, while milk consumption was put at 16.3g/person/day as against the world average of 137.29g/person/day [12]. The fermented beverages were reported to have contributed 65.34kcal/person/day energy and 0.51g/person/day of protein to the diet of an average Nigerian, while the milk consumption was reported as having supplied 10.87kcal/person/day of energy and 0.55g/person/day of protein. It is, however, instructive to note that consumption of these important sources of nutrients is not only low in Nigeria, but also have declined over the years, with consumption of fermented beverages dropping from 188.01g/person/day in 1980 to 168.59g/person/day in 2000 and 159.85g/person/day in 2007 [12]. Similarly, milk consumption which had reached 20.44g/person/day in 1980 fell steadily to as low as 5.95g/person/day in 1997; and only recently picked up to the 16.3g/person/day reported in 2007 [12]. Meanwhile, available statistics point to the need to promote increased consumption of high nutrient food substances among Nigerians, especially among children, of whom, 36% of those under the age of 5years are reported to be underweight, 57% stunted, and 16% wasted [12].

It is against the above background and in recognition of the potentials of NABs in meeting household food and nutrient needs that this study was embarked upon to examine the role of prices and income in household demand for NABs in two Nigerian cities – Abeokuta and Ibadan. The study aims at providing information not only for government policy makers but also for beverage manufacturers, marketers, advertisers/promoters and managers in grocery stores. Knowledge of own price and cross-price sensitivity, substitutability and complementarities among beverages are very important to manufactures and promoters and government policy makers within the beverage industry for appropriate strategies in pricing, marketing, product positioning, identifying at-risk populations and designing nutrition and health policy. The analysis was cast within the framework of an Almost Ideal Demand System (AIDS), which has emerged as the leading framework for analysis of household demand systems [13]. The study focused on milk (including liquid / powdered milk and other dairy products), carbonated soft drinks, tea (also defined to include caffeinated and decaffeinated coffee and tea), fruit juice, cocoa based drinks and other NABs (including non-alcoholic wine, energy drinks, and other locally prepared NABs). Each of these categories of drinks is readily purchased off the shelf and neither requires refrigeration nor freezing temperatures for preservation.

METHODOLOGY

The Study Data

The study was based on primary data obtained in a cross-section survey of households in Abeokuta and Ibadan in the Southwest geopolitical zone of Nigeria. Abeokuta and Ibadan are the capital cities of Ogun and Oyo states in Nigeria. They are two of the 20 largest cities in Nigeria with populations above 500,000 people (2,338,659 for Ibadan and 593,140 for Abeokuta) as at the last Census in 2006 [14]. Ibadan was reputed to be the most populous city in Black Africa in the 1950s until it was recently overtaken by Lagos and Kano in Nigeria. Ibadan is currently made up of 11 Local Government Areas (LGAs) while Abeokuta is largely made up two LGAs – Abeokuta North and Abeokuta South, and part of Odeda LGA.

Sampling Technique

The survey respondents were drawn in a multistage sampling technique, covering six LGAs (three from each of Ibadan and Abeokuta), 60 National Population Commission (NPC) enumeration areas (EAs) (10 EAs from each of the six LGAs), and 407 households (211 from Abeokuta and 198 from Ibadan). The NPC EAs were those used for the 2006 population census in Nigeria, while the households were selected one each per residential building in 20% of residential buildings drawn by systematic random sampling from each of the 60 NPC EAs covered by the study.

The data were obtained by personal administration of a questionnaire designed to elicit information on household demography, income, food and non-food expenditure and prices as well as individual household members' consumption of various food items and NABs. Consumption data, which include both foods taken at home and away from home, were collected using one week recall period, while expenditure and

ajfand SCHOLARLY, PEER REVIEWED
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Volume 13 No. 3
June 2013
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

income were the respective household's estimate of the monthly average over the last three months of the time of visit. Supplementary data on weights/volume as well as nutrient content of the various brands, sizes and packaging of NABs were collected by examining labels attached to the products, and by taking weights of a random sample of some of the products at various locations.

Methods of Data Analysis

The study data were analysed using descriptive and econometric techniques. Simple frequency tables and percentages were used to analyse and describe the socioeconomic background of the respondents. Descriptive statistics (means and standard errors of mean) of the household expenditure on NABS and other relevant variables such as prices, income, and household socio-economic variables were also computed and summarised in tables in a bid to describe the patterns of NABS expenditure. Econometrics techniques which entailed the specification and estimation of a system of NABS demand equations was also employed to analyse the influence of various socioeconomic factors on NABS consumption among households in the study area.

Demand System Specification and Estimation

In this study, a system of six – NABs demand equations were specified and estimated within the framework of a static Linear Approximation of an Almost Ideal Demand System (LA-AIDS) [15]. The AIDS model is grounded in a well-structured analytical framework, accommodates certain types of aggregation, is apparently easy to estimate, and permits testing of the standard restrictions of classical demand theory [16]. Over the years, it has emerged as the leading framework for demand system analysis, and is particularly suited for the study of food demand of different types [17]. While growing evidence in literature suggests the nonlinear version of the AIDS model[1] is preferable to the LA-AIDS when statistical properties such as the estimates being unbiased of the estimates are put into consideration [18, 19], the LA-AIDS version is the most frequently estimated in practice [17] because it is computationally less demanding and less sensitive to data limitations. It is for these reasons that the LA-AIDS framework was adopted in this study. The framework was particularly considered adequate for the study objectives, more so that there are very limited price variations in the data set.

The six categories of NABs considered in the study are:

1. Dairy products including liquid / powdered milk, yogurts, and other dairies (MILK).
2. Cocoa base products meant for preparation of chocolate drinks (CHOCO).
3. Carbonated soft drinks (CARBO).
4. Malt drinks (MALT)
5. Fruit juice (FJUICE), and
6. Other NABs (OTHERS) including tea, coffee, wine and energy drinks.

[1] In non-linear AIDS model, the price index P is defined as: $\ln P = \alpha_0 + \sum_{i=1}^{k} \ln p_i + \frac{1}{2}\sum_{i=1}^{k}\sum_{j=1}^{k} \gamma_{ij} \ln p_i \ln p_j$

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ISSN 1684 5374

Non-alcoholic beverages (NABs) market in Nigeria is oligopolistic. Each of the NAB types is traded under different brand names, packaging and sizes as a result of which consumers pay different prices for the same NAB type mainly because of differences in the available package type, size and/or brand in each locality coupled with consumer preferences. For example, a consumer of any of the carbonated drinks by the Nigerian Bottling Company Limited may pay ₦142.86/litre (US$0.93/litre) if his preference or available package in any one location is the 35cl bottled product commonly sold at a retail price ₦50/unit (US$0.33/unit). The unit price would come down to ₦140.00/litre (US$0.91/litre) if his preference or available package in any one location is the 50cl bottled product commonly sold at N70/unit (US$0.46/unit); and could also be as high as ₦200.00/litre (US$1.31/litre) if he has to go for the 50cl equivalents in plastic can that are retailed at N100.00/unit (US$0.65/unit). There are also slight variations in prices of the same type of product offered for sale under different brand names, with the same practice found in virtually all categories of NABs. Thus, the effective prices paid by the NABs consumers vary, not only across locations, but also across available brands, sizes and packaging; and this allows examination of relative price effects in the estimated demand system.

The specific form of the LA-AIDS model of household NABs demand estimated in the study may be written, in terms of the budget shares, as follows:

$$S_i = \alpha_i + \sum_{j=1}^{6} \gamma_{ij} \ln p_j + \beta_i \ln\left(\frac{M}{P}\right) + \sum_{k=1}^{6} \phi_{ik} Z_k + e_i \qquad (i, j = 1, 2, \ldots, 6) \qquad (1)$$

Where:

S_i is the budget share of the i^{th} category of NABs in the total NAB expenditure;

p_j is the expenditure weighted average price of the j^{th} category of NABs purchased by the reference household (N/kg or N/litre depending on NAB type);

M is the total expenditure on all NABs by the reference household (N/month)

P is the Stone Price Index, defined such that $\ln P = \sum S_i \ln p_i$

Z_k is the k^{th} socio-demographic household characteristic, including the household size and proportion of children under the age of 15years in the household, as well as the gender (Male=0, Female=1), age (years) and education level (years of formal schooling) of the household head, location dummy (Ogun=0, Ibadan = 1).

$\alpha_i, \gamma_{ij}, \beta_i$ are parameters of the model that were estimated.

The system of demand equations was estimated by the Seemingly Unrelated Regression (SUR) method using the appropriate procedure in SHAZAM econometric software (Windows Professional Edition), with the homogeneity, adding-up and symmetry restrictions imposed during estimation. The homogeneity and adding up

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ISSN 1684 5374

restrictions were imposed by: (a) dropping the equation for the sixth NABs category (Other NABs – including tea, coffee, wine and energy drinks), (b) using the price for Other NABs as a numeraire, and (c) imposing the following symmetry restrictions in estimating the resulting five – equation system.

$$\gamma_{ij} = \gamma_{ji} \qquad i \neq 0 \tag{2}$$

The coefficients of the numeraire price for each of five estimated equations as well as parameters of the dropped (other NABs) equation were derived from those already estimated, by applying the following restrictions associated with the adding-up and homogeneity conditions.

$$\sum_{i=1}^{6}\alpha_i = 1, \sum_{i=1}^{6}\gamma_{ij} = 0, \sum_{j=1}^{6}\gamma_{ij} = 0, \sum_{i=1}^{6}\phi_{ik} = 0, \sum_{k=1}^{6}\phi_{ik} = 0 \sum_{i=1}^{6}\beta_i = 0 \tag{3}$$

Estimation of Price and Income Elasticity

Given the parameter estimates, the Marshallian (uncompensated) – own price, cross-price and expenditure elasticities of demand for various categories of NABs were respectively computed as follows:

$$\varepsilon_{ii} = -1 + \left(\frac{\gamma_{ii}}{S_i}\right) - \beta_i \tag{4}$$

$$\varepsilon_{ij} = \left(\frac{\gamma_{ij}}{S_i}\right) - \beta_i\left(\frac{S_j}{S_i}\right) \tag{5}$$

$$\eta i = 1 + \left(\frac{\beta_i}{S_i}\right) \tag{6}$$

The Hicksian (compensated) own price and cross price elasticities (e_{ij}) were also computed, based on the Slusky equation, as follows:

$$e_{ij} = \varepsilon_{ij} + \eta_i S_j \tag{7}$$

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Volume 13 No. 3
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ISSN 1684 5374

RESULTS

Socio-demographic Profile of Sampled Households

Table 1 gives a summary of the socio-demographic characteristics of the sampled households. An average of these urban households is made up of five members, 35.8% of whom are children under the age of 15years. Majority (64.1%) of the households were headed by a male that lived under the same roof and fed from the same port with other members at least during the last one month of the survey. A typical head of the households was 41years of age at the time of the survey, and had at least a secondary school education (76.0%), with as much as 23.3% having had some form of tertiary education. Comparing the households characteristics across the two cities, results in Table 1 suggest that not much differences exists between households in the two cities, except that there were more female headed households in Ibadan (47.3%) than what obtains in Abeokuta (29.0%).

Patterns of Households' NABs Expenditure

Table 2 presents the descriptive statistics of households NABs consumption in the study area. The aggregate household NABs expenditure varies from ₦600.00/month – ₦19, 240:00/month (US$3.92 - 125.70 per month), with the average being ₦5, 235.89 (US$34.21) per month. The bulk (67%) of the NABs expenditure was devoted to MILK (36%) and CHOCO (31%), while other NABs attracts about 3% of the total NABs expenditure. The NABs are purchased at an average of ₦135.15/litre (US$0.88/litre) for carbonated drinks, ₦283.24/litre (US$1.85/litre) for malt drinks and ₦1, 180.24/kg (US$7.71/kg) for cocoa based products that are used in preparing chocolate drinks.

Estimates of the LA-AIDS Model of NABs

Table 3 summarises the parameter estimates of the LA-AIDS model of NABs demand in the study area. Coefficients associated with most of the price terms were not significant in the five estimated equations, with only three (3) out of the 25 coefficients that were directly estimated significant at 10% level in only two (2) of the five (5) equations. However, all the coefficients associated with ln(M/P), being a proxy for effective income, and EDU (years of formal education) were significant at 1% level in all the budget share equations. The coefficients of ln(M/P) were significant and positive in CARBO, MALT, FJUICE and OTHERS equations, but significant and negative in MILK and CHOCO equations. This shows that a typical household tends to lower the shares of dairy products and cocoa-based drinks, which accounts for the bulk of her NABs expenditure, and increase shares of all other categories of NABs with increase in her budgetary allocation to NABs. Increase in education level of the household heads, tends to be associated with higher preference, and thus increase in budget share, of dairy products, fruit juice and Other NABs and reduced preference (manifested in terms of a lower budget share) for other categories of NABs.

In terms of the influence of other explanatory variables, results in Table 3 show that increase in age of household heads tends to be associated with significantly ($p<0.05$)

lower preference for carbonated drinks, while female headed households tends to be associated with significantly ($p<0.01$) higher budgetary allocation to fruit juice. Increase in household size tends to be associated with significantly ($p<0.05$) lower budget shares of malt drinks, while budget share of cocoa-based products tend to rise significantly ($p<0.10$) and that of fruit juice fall significantly ($p<0.10$) with increase in the proportion of children that are 15 years or younger in the household. The results also show that NABs budget of a typical household in Oyo State tends to contain higher budgetary allocation to cocoa-based products than that of an equivalent household in Ogun State.

Demand Elasticity

Tables 4 and 5 summarise the estimates of the Marshallian and Hicksian price and/or expenditure elasticity of demand for the six categories of NABs. All the own price elasticity estimates (Marshallian or Hicksian) were associated negative signs as expected *a-priori*. Own price elasticity of demand for dairy products (MILK), cocoa-based drinks (CHOCO), carbonated drinks (CARBO) and malt drinks (MALT) were revealed to be price inelastic, while those of fruit juice (FJUICE) and other NABs (OTHERS) were revealed to be price elastic. This suggests that most of these NABs (except FJUICE and OTHERS) were treated as necessities by households in the study area. The expenditure elasticities (proxy for income elasticities) were also positive for all the NABs, showing they are treated as normal goods by the households. Twelve out of the 30 cross price elasticity estimates were associated with negative signs. The majority (60%) were positive, indicating that most of the NABs are economic substitutes.

DISCUSSION

The central theme of this study has been to examine the role of income, prices and household socio-economic variables on household demand for non-alcoholic beverages (NABs) in two Nigerian cities – Abeokuta and Ibadan in the South-western zone. The study revealed that an average household in the sample expended ₦5, 235.89 (US$34.21) per month on NABs as at the time of the survey. The NABs expenditures were however, dominated by dairy products (36%), cocoa based products for preparing chocolate drinks (31%) and carbonated drinks (13%), while tea, coffee, wine and energy drinks joint accounted for barely about 3% of the NABs expenditure.

Estimated AIDS model shows that income and education are the key factors that significantly affect demand for NABs, while coefficients of prices were only significant in the equations for carbonated and malt drinks. The study found that increase in income is associated with increase in consumption of all the six categories of NABs. This conforms to a-priori expectations: theoretically, increase in real income implies an increase in purchasing power of consumers, and is, therefore, expected to lead to increased demand for normal goods [20, 21].

The shares of household NABS budget allocated to dairy products and fruit juice were found to rise significantly with increase in education level of the household heads, while those of chocolate drinks, carbonated drinks and malt drinks were found to decline with increase in education of the household heads. These results are, therefore, a pointer to the role of increased education in promoting better (more nutritive and healthier) NABs consumption choices among the populace. It should be noted that increased milk and fruit/vegetable juice consumption is recommended in literature to enhance consumption of balanced diet [5, 6] and lower the risk of some chronic diseases [6, 7]. However, consumption of sugar sweetened beverages and carbonated drinks are discouraged in literature because of their link with some health challenges like obesity [8 – 11].

Evidence in this study shows that the budgetary share of fruit juice tends to be significantly higher among female-headed households than those of their male counterparts, while budget shares of carbonated drinks decline significantly with increase in age of the household heads, just as budget shares of malt drinks decline significantly with increase in household size. This shows that female headed households are more likely to choose NABs that are rich in vitamins and minerals than their male counterparts, while consumption of carbonated drinks is linked more with households headed by younger people than what obtains among older heads.

Another key evidence from this study is the fact that the share of NABs budget allocated to cocoa-based products rise significantly with increase in the proportion of children (15 years or younger) in the household. The converse is the case in respect of fruit juice. This shows that cocoa-based drinks are favourite NABs of households with children (15years or younger), while fruit juice consumption tends to be less favoured in such households.

While limited significant price effects were found, perhaps because of reliance on cross-sectional data in this study, all the own-price elasticity of demand for the various beverages have the appropriate negative signs, with demand for dairy products and cocoa-based drinks revealed as being price elastic, while the those of carbonated drinks, malt drinks, fruit juice and other NABs were price inelastic. Thus, rising prices are associated with decline in demand for NABs in these cities. It could, therefore, be inferred, that the reported decline in per caput NABs consumption in Nigeria over the years [12] is most likely a product of sharp increases in prices of most commodities leading to a declining purchasing power (lower real income) in Nigeria, with the composite Consumer Price Index (May 2003 = 100), rising sharply from 5.7 in 1990 to 72.9 in 2000 and 216 in 2009 [22].

CONCLUSION

A number of important conclusions with far reaching policy implications may be reached based on evidence in this study. First, urban households in southwest Nigeria consider NABs as normal goods. Hence, these households will only increase NABs consumption if there is an increase in their real income, while a dwindling real

income tends to be associated with declining household NABs consumption. Second, given that demand for dairy products and cocoa-based products is price elastic, performance of agribusiness firms involved in the production and supply of these NABs can only be enhanced significantly by offering the products for sale at competitive prices. Third, this study points at increased education as a factor that leads the urban households to make right (more nutritive and healthier) NABs consumption choices.

RECOMMENDATION

On the basis of the study findings, the following recommendations are proffered in a bid to promote healthy NABs consumption choices among urban households in Southwest Nigeria, and enhance performance of agribusiness firms involved in NABs production and marketing in the study area.

- There is a need for governments at various levels in Nigeria to intensify efforts to reduce incidence of poverty and enhance purchasing power of the populace in order to stimulate increased consumption of nutritive, health friendly, and/or calorie rich NABs among other food commodities. This may be achieved by supporting pro-poor/labour intensive growth of the food and beverage industry, among others, to create employment and enhance real income. The government support may come through provision of input subsidy, tax reliefs and provision of relevant infrastructure that can facilitate operations of the food and beverage industry. Other measures that can enhance real income among the populace include adoption of contractionary monetary policies to keep food prices and general price level low.
- Bearing in mind that demand for dairy products and cocoa-based products is price elastic, agribusiness firms involved in the products should emphasise cost saving production and product distribution strategies rather than charging higher prices in order to enhance their performance.
- Measures aimed at reducing negative consequences of NABs consumption such as obesity, should emphasize increase in education with some emphasis on nutrition and health education.

ACKNOWLEDGEMENT

The authors wish to thank the following for their role in the collection of the study data: Abiola Abimbola, Akinwande Aanu, Aninnkan O., Oladosu Catherine, Olanrewaju Kafayat, Omotosho Abeeb and Sabitu Akinyemi.

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Volume 13 No. 3
June 2013
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 1: Socio-economic Characteristics of Sampled Households

Description	City		All Households
	Abeokuta	Ibadan	
Age of Household Head (years)			
• 30 or less	24.2%	15.5%	20.9%
• 31 – 40	28.0%	44.5%	34.2%
• 41- 50	24.7%	20.9%	23.3%
• 51 – 60	17.0%	14.5%	16.1%
• Above 60	6.0%	4.5%	5.5%
Mean Age (years)	41.4	40.6	41.1
Gender of household head			
• Male	71.0%	52.7%	64.1%
• Female	29.0%	47.3%	35.9%
Education level of household head			
• None formally	9.9%	1.8%	6.8%
• Primary	20.4%	11.8%	17.2%
• Secondary	46.0%	63.6%	52.7%
• Tertiary	23.6%	22.7%	23.3%
Household size			
• 1 –4	28.6%	35.5%	31.2%
• 5–8	58.8%	58.2%	58.6%
• 9–12	11.0%	5.5%	8.9%
• 13 or more	1.6%	.9%	1.4%
Mean household size	5.4	5.1	5.3
Proportion of Children (<15years)			
• Below 25%	36.8%	32.7%	35.3%
• 25 - <50%	30.8%	43.6%	35.6%
• 50 - <75%	30.8%	23.6%	28.1%
• 75% or more	1.6%		1.0%
Mean of children's proportion	36.9%	34.0%	35.8%

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Table 2: Descriptive statistics of Household NABs Demand

Description	Minimum	Maximum	Mean	Std. Dev.
NABs Expenses (N/month)				
Dairy Products (MILK)	160.00	10,000.00	1,775.78	1,472.32
	(1.05)	*(65.33)*	*(11.60)*	*(9.62)*
Cocoa-based drinks (CHOCO)	80.00	7,400.00	1,326.49	991.60
	(0.52)	*(48.35)*	*(8.67)*	*(6.48)*
Carbonated Drinks (CARBO)	-	5,600.00	812.56	1,015.55
	(-)	*(36.59)*	*(5.31)*	*(6.63)*
Malt drink (MALT)	-	4,800.00	560.10	782.47
	(-)	*(31.36)*	*(3.66)*	*(5.11)*
Fruit juice (FJUICE)	-	4,000.00	518.49	841.01
	(-)	*(26.13)*	*(3.39)*	*(5.49)*
Other NABs (OTHERS)	-	4,720.00	242.47	699.48
	(-)	*(30.84)*	*(1.58)*	*(4.57)*
Total NABs Expenditure	600.00	19,240.00	5,235.89	3,747.38
	(3.92)	*(125.70)*	*(34.21)*	*(24.48)*
Purchase Price				
Dairy Products (MILK) (N/litre)	681.82	4,285.71	1,163.36	250.49
	(4.45)	*(28.00)*	*(7.60)*	*(1.64)*
Cocoa-based drinks (CHOCO) (N/kg)	555.56	2,111.11	1,180.24	167.31
	(3.63)	*(13.79)*	*(7.71)*	*(1.09)*
Carbonated Drinks (CARBO) (N/litre)	65.00	200.00	135.15	16.63
	(0.42)	*(1.31)*	*(0.88)*	*(0.11)*
Malt drink (MALT) (N/litre)	181.82	606.06	283.24	48.06
	(1.19)	*(3.96)*	*(1.85)*	*(0.31)*
Fruit juice (FJUICE) (N/litre)	80.00	800.00	280.24	67.39
	(0.52)	*(5.23)*	*(1.83)*	*(0.44)*
Other NABs (OTHERS) (N/kg)	303.03	1,060.61	596.02	189.32
	(1.98)	*(6.93)*	*(3.89)*	*(1.24)*
NABs Budget Share				
Dairy Products (MILK)	0.08	0.89	0.36	0.17
Cocoa-based drinks (CHOCO)	0.02	0.88	0.31	0.17
Carbonated Drinks (CARBO)	-	0.57	0.13	0.13
Malt drink (MALT)	-	0.41	0.09	0.11
Fruit juice (FJUICE)	-	0.41	0.07	0.11
Other NABs (OTHERS)	-	0.37	0.03	0.07

NOTE: Figures in parentheses are US$ equivalent of the associated figures
The average US$/N exchange rate in 2010 was ₦153.06/US$1.00 [23]

ajfand SCHOLARLY, PEER REVIEWED
AFRICAN JOURNAL OF FOOD, AGRICULTURE, NUTRITION AND DEVELOPMENT
Volume 13 No. 3
June 2013
PUBLISHED BY AFRICAN SCHOLARLY SCIENCE COMMUNICATIONS TRUST
ISSN 1684 5374

Table 3: Parameters of Estimated LA-AIDS Model of Household NABs Demand

	MILK	CHOCO	CARB	MALT	FJUICE	OTHERS
Constant	0.301***	0.639***	0.267***	-0.097	-0.035	-0.075
	(3.23)	(7.85)	(2.88)	(-1.45)	(-0.572)	
$\ln P_1$	0.076	-0.059	-0.052	0.031	-0.019	0.023
	(1.41)	(-1.62)	(-1.46)	(1.37)	(-0.71)	
$\ln P_2$	-0.059	-0.019	0.018	0.023	0.020	0.017
	(-1.62)	(-0.45)	(0.60)	(0.85)	(0.85)	
$\ln P_3$	-0.052	0.018	0.08*	-0.05*	0.026	-0.022
	(-1.46)	(0.60)	(1.83)	(-1.79)	(1.06)	
$\ln P_4$	0.031	0.023	-0.049*	0.022	-0.024	-0.003
	(1.37)	(0.86)	(-1.78)	(0.68)	(-1.13)	
$\ln P_5$	-0.019	0.020	0.026	-0.024	-0.017	0.014
	(-0.71)	(0.85)	(1.06)	(-1.13)	(-0.67)	
$\ln P_6$	0.013	0.016	-0.026	-0.012	0.014	-0.005
$\ln(M/P)$	-0.091***	-0.119***	0.074***	0.054***	0.056***	0.026
	(-9.85)	(-14.56)	(10.58)	(8.56)	(9.28)	
z_1(Age)	0.0003	0.0004	-0.002**	0.001	-0.0003	0.001
	(0.35)	(0.51)	(-2.52)	(1.03)	(-0.63)	
z_2 (Gender)	-0.011	-0.025	-0.011	-0.004	0.048***	0.003
	(-0.81)	(-1.57)	(-0.77)	(-0.34)	(4.07)	
z_3 (Edu)	0.009***	-0.004**	-0.005***	-0.002**	0.002*	0.0004
	(5.30)	(-2.45)	(-4.14)	(-2.02)	(1.82)	
z_4 (hhsize)	0.005	0.004	0.002	-0.009**	-0.001	-0.001
	(0.90)	(0.77)	(0.51)	(-2.39)	(-0.22)	
z_5(Pchild)	0.011	0.061*	-0.034	0.020	-0.044*	-0.014
	(0.24)	(1.88)	(-1.2)	(0.80)	(-1.88)	
z_6	0.005	0.030*	0.013	-0.017	-0.012	-0.019
(Location)	(0.24)	(1.84)	(0.89)	(-1.33)	(-0.95)	

NOTE: Figure in parentheses are standard errors of associated estimates
***, ** and *imply the coefficients are significant at 1%, 5% and 10% levels, respectively

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Table 4: Estimates of Marshallian (uncompensated) demand elasticities

	Price elaticities						Expenditure
	Milk	**Choco**	**Carb**	**Malt**	**Fjuice**	**Others**	**Elasticities**
Milk	**-0.70**	-0.05	-0.60	0.22	-0.53	0.14	0.75
Choco	-0.08	**-0.94**	-0.03	0.06	0.04	0.31	0.61
Carb	-0.11	0.11	**-0.44**	0.62	0.25	-0.10	1.56
Malt	0.13	0.11	-0.42	**-0.81**	-0.39	-0.55	1.59
Fjuice	-0.03	0.09	0.15	-0.30	**-1.29**	0.42.	1.76
Others	0.04	0.06	0.21	-0.16	0.17	**-1.19**	1.87

Table 5: Estimates of Hicksian (Compensated) Price Elasticities

	Milk	**Choco**	**Carb**	**Malt**	**Fjuice**	**Others**
Milk	**-0.42**	0.18	-0.03	0.81	0.11	0.86
Choco	0.15	**-0.75**	0.45	0.56	0.59	0.92
Carb	-0.01	0.19	**-0.24**	-0..14	0.49	-0.84
Malt	0.20	0.16	-0.16	**-0.66**	-0.23	-0.37
Fjuice	0.02	0.14	0.29	0.19	**-1.16**	-0.57
Others	0.06	0.08	-0.19	-0.11	0.21	**-1.14**

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