Journal of Forestry Research and Management. Vol. 19(4).86-98; 2022, ISSN 0189-8418

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DETERMINANTS OF HOUSEHOLD CONSUMPTION CHOICE FOR SELECTED NON-TIMBER FOREST PRODUCTS IN JOS-NORTH, PLATEAU STATE, NIGERIA

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ABSTRACT

Non-timber forest products (NTFPs) comprise of multipurpose products extracted from the forest ecosystem and utilized within households and cottage industries. However, several socioeconomic factors affect household consumption of NTFPs. Therefore, this study analyzed determinants of household consumption choice for selected NTFPs in Jos-North, Plateau State, Nigeria. Multi-stage sampling technique was used to select 100 respondents for the study. Primary data were collected using structured questionnaire. Data were analyzed using descriptive statistics and Multinomial Logit regression. The mean age, household size and income were 33years, 12 people and ₦35,200 respectively; 68% are male, 59% were married, 39% attained secondary education and 53% had poor and inadequate access to the NTFPs. The prevalent NTFP consumed was honey (62%); however, several household factors affected consumption choice for the NTFPs. The perceived benefits derived from the NTFPs include food (94%); medicinal purpose (93.7%); income (71%); raw material (39%); forage (57.9%); and biofuel (15%). Additionally, -2 log-likelihood (47.51) and Cox & Snell R^2 (0.673) were estimated. Moreover, the significant determinants of household consumption choice for the NTFPs were age, household size, access to NTFPs, benefits derived and household income. Also, constraints of household consumption choice for the NTFPs include high cost (82%), poor market access (65%), scarcity of NTFPs (52%); inadequate information on NTFPs (43%), poor storage facilities (37%), consumption preferences (29%) and seasonal product availability (15%). Conclusively, NTFPs were relatively available and consumed by households in the area; however, socioeconomic factors, benefits derived and the identified constraints were determinants of household consumption choice for the selected NTFPs. Therefore, this study recommends adoption of policy initiatives in the forestry sector to enhance sustainable forest extraction, conservation and utilization.

Keywords: Constraints, consumption choice, determinants, households, perceived benefits, NTFPs

Introduction

Non timber forest products (NTFPs) are goods of biological origin other than timber derived from the forest, (NWN, 2012) Non timber forest products play a vital role in contributing to food security of the rural dwellers by providing a wide range of foods which supply essential nutrients and vitamins. Non-timber forest products (NTFPs) comprise of all the production aside wood extracted from forest ecosystem and utilized within households; they also have sociocultural significance (FAO, 2002). They include plants and plants materials used for food/fruit, fuel, fodder, medicinal and industrial purposes; animals, birds, reptiles, nuts, seed, berries, mushroom, oils and foliage (Aiyeloja *et al.,* 2006). Like timber, NTFPs may further be processed into consumer oriented products (Vinceti *et al.,* 2013). Non

timber Forest Products (NTFPs) include products used as food and food additives such as edible nuts, mushroom, snails, fruits, herbs, spices, condiments and aromatic plants (Ahenkan and Boom, 2011). The contribution of NTFPs to food security is even more significant as they provide not only the staple foods that help to overcome hunger but a number of dietary substances through supplemental foods (Vinceti *et al*., 2013). Non-Timber Forest Products species are used as food in the form of wild fruits, vegetables, and nuts, edible roots, snails, edible insects and honey.

Others are used as food additives in form of spices, food colorants, and livestock fodder (Babulo *et al.*, 2009). Similar reports on the use of NTFPs as food and food condiments have been made by Vinceti *et al.* (2013) and Tee and Amonum (2008). Other edible food materials found in the forest include insects, rodents and wild game (Jimoh and Adebisi, 2005). Awe *et al.* (2011) opined that most (98%) of respondents affirmed that they collect and use NTFPs as food. The prevalent NTFPs consumed by households include wild fruits (*Chrysophyllum albidum*), bitter leaf (*Veronia sp.*), honey (*Apis mellifera*), nuts, snails (*Helix pomatia*), edible insects, bush mango (sweet) (*Archachantina marginata*), wrapping leaf (*Elais guineensis*), African locust bean (*Parkia Biglobosa*), bush onion (*Afrostyrax lepidophyllus*), mushroom (*Pleurotus tuberosus*), bush pear (*Afromomum sp*.), bush pumpkin (*Telferia sp.*), bush pepper (*Piper guineensis*), palm kernel (*Coula edulis*), African oil bean (*Pentaclethra macrophylla*), rahia palm (*Raphia hookeri*), and so on. Amusa and Jimoh (2012) reported that non-timber forest products are particularly important in ensuring food security, maintaining nutritional balance in people's diets and contributing to healthcare system. Other important roles of NTFPs include income generation in rural communities, equitable sharing of forest benefits and local participation in forest management as documented by the Food and Agricultural Organization (FAO) report on community forest management in developing countries (FAO, 2002). Value addition also makes NTFPs highly demandable and marketable and can contribute to livelihood security.

Socioeconomic variables such as household size, gender, product price and access, household income, and age composition play an important role in determining household consumption choices. Therefore, it is important to estimate the impact of these factors on NTFP consumption by specifying the determinants of observed household-specific consumption choices; and as such, target government programs on particular classes of food for households and determine the amount of assistance required to bring vulnerable households to acceptable consumption standards (Ezedinma, 2005). Socioeconomic variables are major determinants of consumption choices and patterns; changes in these demographic variables can cause shifts in consumption behavior. Although these shifts may be caused by changes in such non-economic factors such as psychological needs, attitudes, health factors and sociological influences; demographic variables are useful proxies when investigating the underlying shifts in consumption behavior and the variations in consumption patterns among individuals. Estimation using pooled data without incorporation of demographic variables implicitly assumes identical tastes (or preferences) among the observations.

This is not consistent with the observed facts in household data; hence, in other to get better estimates, several techniques for incorporating demographic effects have been developed. Ideally, there are two ways to incorporate demographic effects in consumption behavior; one is to use unpooled data and the other to use pooled data (Pollak and wales, 1978). The first approach assumes all the parameters of consumption

behavior are homogenous demographic variables. The major drawback of this approach, apart from its apparent inefficiency, is that it does not make it possible to draw inference about households with one demographic profile from observations on the behavior of households with different profiles. The second approach, which uses pooled data, involves three separate but interrelated steps (Pollak and Wales, 1980). The first step involves specifying the consumption pattern for every admissible household. The second step involves specifying demographic variables/parameters that affect consumption behavior; and the third step involves specification of a functional form (regression model) well fitted for the specified parameters/ demographic variables affecting households consumption choice.

However, despite the potential benefits that are derived from Non-Timber Forest Products species, they are perceived to be poorly understood, under-estimated and not adequately considered in policy decisions related to food security and nutrition. Also, relative scarcity of NTFPs resulting from deforestation was reported by Hedge and Enters (2000). There are challenges with NTFPs as development mechanisms for agrarian communities, such as insecure land tenure, inequitable access to market, poor extraction methods, etc. With respect to timber, NTFPs are neglected and the capacity of promoting sustainable use that facilitates increased financial benefits as incentives for forest conservation is consequently low. Many gaps exist in the understanding of forest products, taxonomic classifications, socioeconomic values and policy contexts for their sustainable use (Ros-Tonen, 2012). Existing knowledge and expertise is poorly documented, inaccessible and often neglected. There is a lack of appropriate methods and tools of promoting sustainable use of NTFPs and successful regulation of trade and the relevant lessons from the field are rarely examined to inform policy development (Saxena, 2003). Furthermore, poor extraction methods and underdevelopment affects availability of non-timber forest products.

There are challenges in meeting the demand of NTFPs due to poor extraction methods; which limits consumers who really need these products for their well-being, pharmaceutical and industrial use from accessing these products. In the area of underdevelopment, interventions are required to increase production of NTFPs; otherwise these products become very scarce. This research aimed at bridging the identified knowledge gaps about NTFPs; it reveals how household factors affect the consumption of NTFPs in the study area. Hence, this study will be critical for the agro forest product sector; environmental management and intensification of NTFP value chains (Saxena, 2003). Therefore, this study analyzed the determinants of household consumption choice for selected NTFPs in Jos-North, Plateau State, Nigeria; specifically, the study assessed the socioeconomic characteristics of the households; prevalent NTFPs consumed; perceived benefits of the selected NTFPs; analyzed factors influencing consumption of the selected NTFPs and identified the consumption constraints of selected NTFPs by households in the study area.

Methodology

Study Area

This study was carried out in Jos North Local Government Area (LGA), Plateau State, Nigeria; with coordinates at longitude 7°59'57'' and 9°15'33''E and latitude 9°24'59'' and 10°44'34"N. The LGA has a near temperate climate; with average temperature between 18°C-30°C and annual rainfall of 1,400 -2,000mm per annum (NBS, 2012). It covers an area of 8600 km² and bounded by escarpments. The LGA has an average altitude of 1,280m. Its landscape is divided into three broad (3) physiographic units: hills and

mountains, dissected terrain, and undulating terrain. The nature of the relief is closely related to the underlying rock types (UNEP-WCMC, 2020). Its vegetation unit consists mainly of short trees and grasses, comprising the guinea forest-savannah mosaic eco-region. Its montanne grasslands, savannahs, open woodland and forests are home to diverse plant and animal species (Dinerstein *et al*., 2017). Approximately 1,199 km² (9%) of the eco-region are in protected areas; predominantly limited to remote areas, inaccessible sites and river embankments. Currently there is no conservation program for this eco-region; resulting to loss of the native savannah and woodlands to farmland conversion and firewood collection (Dinerstein *et al*., 2017).

The domestic fauna in the area consists of chickens, ducks, dogs, goats, a few swine, and numerous cattle of the white Fulani or Zebu breed. Large wild animals are very scarce (UNEP-WCMC, 2020). The principal food crops include millets, sorghum, maize, guinea corn, cocoyam (*Colocasia sp*.), cassava and potatoes being cultivated on a commercial scale in some areas. Bananas are grown in moist areas along streams and occasionally within the family compounds. Mango, avocado, moringa and citrus trees are interspersed and prevalent; as well as small plots of various garden crops including carrots, cabbages, tomatoes, cucumbers, etc., are grown on a small commercial scale (Dinerstein *et al*., 2017). Various trees are maintained at the rural settlements for shade and for their fruit; eucalyptus are grown in plantations to supply poles and firewood, oil palm trees are sparse, *Cassia sp*. are planted along some roadsides; *E. poissoni* are used to form hedges around the family compounds and small farms in the rural areas. The drainage systems in the area are radial and the source of numerous rivers; the Kaduna River drains the western slopes, flowing southwest to join the Niger. The Gongola River drains eastwards to join the Benue. The Hadejia and Yobe rivers flow northeast into Lake Chad (NBS, 2012). The study area is home to people of diverse cultures and languages.

Sampling Procedure

Multi-stage sampling technique was used in selecting respondents for this study. In the first stage Jos-North LGA was purposively selected due to the prevalence of households that consume the selected NTFPs. In the second stage, household settlements were grouped into units called clusters; two (2) residential clusters were identified for this study, based on their population density and demographic structure. Each cluster comprised of three (3) settlements. Cluster A comprised the following settlements; Angwuan Rogo, Ali Kazaure and Rikkos, while Cluster B comprised the following settlements; Apollo crescent, Rock haven and Ibrahim Taiwo. In the final stage, from a sample frame compiled by the local enumerators in the selected settlements in synergy with extension agents from the Program Coordinating Unit (P.C.U) at the LGA secretariat, a constant proportionality rule of 5% (0.05) was applied to derive the sample size; thus, 100 respondents were randomly selected for this study; and the sample frame and size distribution is presented in Table 1.

Journal of Forestry Research and Management. Vol. 19(4).86-98; 2022, ISSN 0189-8418

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Table 1: Sample Frame and Size

Clusters	Settlements	Sample frame	Sample size (5%)
A	Angwuan Rogo	460	23
	Ali Kazaure	243	12
	Rikkos	165	8
B	Apollo crescent	342	17
	Rock haven	583	29
	Ibrahim Taiwo	221	11
	Total	2,014	100

Source: Field Survey (2021)

Methods of Data Collection

Data for this study were obtained from primary sources; using well-structured questionnaires.

Analytical Techniques

Data collected were analyzed using descriptive statistics (frequency counts, percentages, and means) and Multinomial Logit regression.

Multinomial Logit Regression Model

The Multinomial Logit regression analysis was used to analyze the factors influencing household consumption choice for selected NTFPs (honey, wrapping leaf, mushroom and African oil bean). It specifies the relationship between the consumption choice for the selected NTFPs (honey, wrapping leaf, mushroom and African oil bean) and explanatory variables influencing those choices (Greene, 2003). The implicit model is expressed as follows in equations 1 and 2:

$$pr\,(y_i = j) = \frac{e\beta_j x_{ii}}{1 + \sum_{m=0}^{n} e^{\beta m x i j}} \quad j = 0,1,2,3..n \ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where: Y_i = dependent/response variable [(consumption choice) (*i;* 1= honey; 2= wrapping leaf; 3= mushroom; 4 = African oil bean)]; $ß_j$, $ß_m$ = vector of the estimated parameters or unknown coefficients; x_{ii}, x_{ij} = vector of explanatory variables; and *e* = error term. Alternatively, the implicit model can be expressed as follows:

$Y_i = ß_o + ß_i X_i + e_i$ ……. (2)

Where; Y_i= multivariate response variable of household consumption choices such that: Y=1 for honey, Y=2 for wrapping leaf, Y=3 for mushroom and Y=4 for African oil bean; $ß_0$ = intercept/ constant term; $ß_i$= coefficient of the estimated parameters; X_i= Set of independent variables; and e_i = error term which is normally indicated as zero mean and variance. However, the multinomial logit regression model can be specified in its explicit form and presented in equation 3, as follows:

$Y = ß_0 + ß_1X_1 + ß_2X_2 + ß_3X_3 + ß_4X_4 + ß_5X_5 + ß_6X_6 + e_i$…… (3)

Where; Y_i = dependent/response variable [(consumption choice) (*i;* 1= honey; 2= wrapping leaf; 3= mushroom; 4 = African oil bean)]; $ß_0$ = intercept; $ß_1$ - $ß_6$= estimated coefficients (Regression coefficients of X_1 –X_6); X_1=age (years); X_2=gender (male = 1; female = 0); X_3= Household size (Numbers); X_4= Access to NTFPs (1= Yes; 0= No); X_5= Benefits derived [(Nominal) (1=food; 2=medicinal purposes; 3=alternative income; 4=raw materials; 5=forage/fodder; 6=biofuels)]; X_6= Household income (₦); and e_i =Error term.

Results and Discussion

Socioeconomic Characteristics of the Respondents

Results in Table 2 revealed that 41% of the respondents are in the age bracket of 30-39 years. They mean age was 33 years. This is an indication of a predominant adult population with variations in consumption behavior and expenditures; within this age bracket consumption of NTFPs are highly recommended as food requirements, due to their nutritional contents and health benefits. Adequate consumption of NTFPs will be required by individuals within this age bracket so as to maintain healthy life styles. This corroborates with Babulo *et al*. (2009) who reported similar result in their study of forest resources and livelihoods. In addition, most (68%) of the respondents are male; while 32% were females. This indicates that the respondents were predominantly male; attributable to the fact that most of the households were male headed; with peculiar exceptions and thus household consumption choices and decisions, particularly for NTFPs are dependent upon the household head.

This corroborates with Amusa and Jimoh (2012), who reported similar result in their study on NTFPs. Also, most (59%) of the respondents were married, while 41% are single. The household population of married respondent's in the area comprised both nuclear and extended family members. Thus, marital status is also a determinant of household size; and consequently household consumption behavior and preferences. This corroborates with Ahenkan and Boom (2011) who reported similar result in their study on NTFPs and rural households. Besides, most (67%) of the respondents have household size of 10 – 19 people. The average household size of the respondents in the study area was 11 people. Thus, an increase in population also increases the likelihood of more and additional quantities of NTFPs consumed by households in the area. This corroborates with Aiyeloja and Ajewole (2006) who reported similar outcomes. Furthermore, 39% of the respondents attained secondary education; those without formal education were 18%; and 17% had tertiary education. This is an indication that a greater proportion of the respondents were literate. This enables them to have a better understanding of the economic/ nutritional value and health benefits of the NTFPs. This knowledge facilitates improved consumption of the selected NTFPs among respondents in the study area. This corroborates with Awe *et al*. (2011) who reported similar result in their study on NTFPs and rural households. Moreover it was revealed that most (61%) of the households earned =₦29,999 per month.

The estimated average household income per month was ₦35,200. This is an indication that most of households in the study area were in the low income bracket; the implication of this is that most of the households had very low disposal incomes which compete with several other consumption expenditures and hence this affects household consumption behavior and choices. There is a direct correlation between household income and consumption choice/preferences, particularly for NTFPs. This corroborates with (https://www.statista.com/statistics/1119087/monthly-living-wage-in-nigeria/) which reported similar income rates. Furthermore, 53% of the households had no access to most of the selected NTFPs while 47% of the respondents had access to some of the selected NTFPs. This is an indication that the supply of and access to the selected NTFPs in the area is grossly inadequate and relatively poor; however, honey and African oil bean were more available and prevalent, while wrapping leaf and mushroom were relatively scarce commodities in the area; attributable to poor extraction methods, product awareness and inadequate market channels, resulting to inflated

prices for these products when available; this factor further constrains household consumption for these NTFPs in the study area. This corroborates with Saha and Sundriyal (2012) who reported similar result in their study on utilization of NTFPs in humid tropics.

Table 2: Distribution of the Respondents Based on their Socioeconomic Characteristics

Variable	Mean	Frequency	%
Age (years)			
=29		29	29
30-39		41	41
=50	33.1	30	30
Gender			
Female		32	32
Male		68	68
Marital status			
Married		59	59
Single		41	41
Household size (population)			
=9		7	7
10-19		67	67
=20	12.7	26	26
Educational level (years)			
Non-formal(=3)		18	18
Primary (4-6)		26	26
Secondary (7-12)		39	39
Tertiary (=13)		17	17
Household Income(₦)			
≤29,999		61	61
30,000-79,999		35	35
=80,000	35,200	4	4
Access to NTFPs			
No		53	53
Yes		47	47

Source: Field Survey (2021)

Selected NTFPS

Result in Table 3 revealed that the prevalent NTFPs consumed by households in the study area were honey (62%); African oil bean (49%); wrapping leaf (26%); and mushroom was 13%. This result indicates a relative availability of NTFPs in the study area. However, the respondents reported that mushroom and wrapping leaf were relatively scarce and expensive commodities in the area, despite their nutritive/economic value and health benefits; improved production, extraction and accessibility to these products is required to mitigate this trend. This corroborates with Tee and Amonum (2008) who reported similar result in their study on NTFPs for sustainable livelihoods.

Journal of Forestry Research and Management. Vol. 19(4).86-98; 2022, ISSN 0189-8418
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Table 3: Distribution based on NTFPs Consumed by Households

NTFPs	Frequency*	%
Honey	62	62
Wrapping leaf	26	26
Mushroom	13	13
African oil bean	49	49

Source: Field Survey (2021); * = Multiple responses.

Perceived Benefits of NTFPs

Result in Table 4 revealed the benefits derivable from NTFPs as noted by the respondents in the study area. The perceived benefits of NTFP consumption by households include: food (94%); medicinal purposes (88%); alternative income (71%); raw materials (55%); forage/fodder (26%); and biofuels (15%). This result is an indication that the selected NTFPs have multiple socioeconomic benefits and can serve several purposes.

The benefits derived influence household consumption choice for the NTFPs in the study area. This corroborates with Saxena (2003) and Marshall *et al*. (2003) who reported similar results in their respective studies on NTFPs.

Table 4: Distribution based on the Perceived Benefits of NTFPs

Benefits	Frequency*	%
Food	94	94
Medicinal purposes	88	88
Alternative income	71	71
Raw materials	55	55
Forage/fodder	26	26
Biofuels	11	11

Source: Field Survey (2021); * = Multiple responses.

Determinants of Household Consumption Choice for selected NTFPs

The result in Table 5 revealed that the estimate of -2log-likelihood was 47.51, suggesting that the variables in the regression model had significant correlation with the variation in households consumption choice for the selected NTFPs. Therefore, a significant cause-effect relationship between household consumption choice for the selected NTFPs and the specified explanatory variables in the model exists; hence at 1% level of significance, the hypothesis that the specified variables in the regression model have no significant influence on household consumption choice for the selected NTFPs is rejected. The estimated Cox & Snell R^2 was 0.673. This indicates that 67% variation in household consumption choice for the selected NTFPs was accounted for by the specified variables in the regression model; the remaining 33% not explained may be due to omitted variables and the error term. Consequently, the regression result interpretation suggests the following:

Age: The coefficients for age of respondents that consume the NTFPs; honey (0.534), mushroom (0.427) and African oil bean (0.765) were all positive and statistically significant at 5% (p<0.05) level of probability respectively;

implying that as the respondents advance in age, the likelihood of consuming any of the NTFPs increases. The consumption choice/ preference for the selected NTFPS were more prevalent among older respondents. This may be attributable to the nutritive value and health benefits associated with the consumption of these NTFPS. However, the coefficient for age (0.294) of respondents that utilized wrapping leaf was not significant; the consumption of this product cuts across all age brackets. This result is in consonance with previous studies by Asfaw *et al*., 2013; Vantomme (2011); and Kaimowitz (2003) who reported similar outcomes.

Household size: The coefficients for household size of respondents that consume the NTFPs; honey (0.367), wrapping leaf (0.648), mushroom (0.936) and African oil bean (0.478) were all positive and statistically significant at 5% (p<0.05) level of probability, respectively; suggesting that larger households tend to consume more and extra quantities of the selected NTFPs, *ceteris paribus*. This corroborates with Vinceti *et al*., 2013, who also reported similar results in their study on NTFPs.

Access to NTFPs: The coefficients of access to the NTFPs by respondents; honey (-0.495), wrapping leaf (-0.704), mushroom (-0.257) and African oil bean (-0.606) were all negative and statistically significant at 5% (p<0.05) level of probability, respectively. Thus, poor and inadequate access to the selected NTFPs decreases the likelihood and quantities of the NTFPs consumed by households. This is consistent with the findings of Aiyeloja and Ajewole (2006) who reported similar results in their study on NTFPs.

Benefits derived: The coefficients of benefits derived from the NTFPs by the respondents; honey (0.693), wrapping leaf (0.808), mushroom (0.86) and African oil bean (0.0.904) were all positive and statistically significant at 1% (p<0.01) level of probability, respectively. This implies that the derivable benefits from the consumption of these NTFPs would increase the likelihood and quantities consumed by households; the respondents tend to adjust their consumption choice and preferences to NTFPs with more derivable benefits, *ceteris paribus*. This corroborates with Shackleton *et al*., 2015, who also reported a similar outcomes.

Household income: The coefficients for household income of respondents that consumed the NTFPs; honey (0.447), wrapping leaf (0.586), mushroom (0.601) and African oil bean (0.588) were all positive and statistically significant at 1% (p<0.01) level of probability, respectively. This implies that change in income level increases the likelihood of more and additional quantities of the NTFPs consumed by households in the area; attributable to an increase in the purchasing power and disposable income of households. This is consistent with Jimoh and Adebisi (2005) who reported a similar result in their study of NTFPs and Sustainable Forest Management.

Table 5: Factors Influencing Household Consumption Choice for Selected NTFPs

Variables	Coefficient	Standard error	T-Value
Honey			
Constant	4.218	1.576	2.676**
Age (x_1)	0.534	0.211	2.531**
Gender (x_2)	0.702	0.572	$1.227^{n.s}$
Household size (x_3)	0.367	0.142	2.585**
Access to products (x_4)	-0.495	0.188	-2.633**

Benefits derived (x_5)	0.693	0.17	4.076***
Household income (x_6)	0.447	0.109	4.101***
Wrapping leaf			
Constant	7.853	3.13	2.509**
Age (x_1)	0.294	0.22	$1.336^{n.s}$
Gender (x_2)	0.613	0.504	$1.216^{n.s}$
Household size (x_3)	0.648	0.256	2.531**
Access to products (x_4)	-0.704	0.281	-2.505**
Benefits derived (x_5)	0.808	0.195	4.144***
Household income (x_6)	0.586	0.14	4.186***
Mushroom			
Constant	4.432	1.712	2.589**
Age (x_1)	0.427	0.161	2.652**
Gender (x_2)	0.834	0.626	$1.332^{n.s}$
Household size (x_3)	0.936	0.37	2.53**
Access to products (x_4)	-0.257	0.1	-2.57**
Benefits derived (x_5)	0.86	0.212	4.057***
Household income (x_6)	0.601	0.15	4.01***
African oil bean			
Constant	5.829	2.287	2.548**
Age (x_1)	0.765	0.302	2.533**
Gender (x_2)	0.813	0.683	$1.19^{n.s}$
Household size (x_3)	0.478	0.253	2.713**
Access to products (x_4)	-0.606	0.229	-2.646**
Benefits derived (x_5)	0.904	0.21	4.304***
Household income (x_6)	0.588	0.13	4.292***
-2 Log likelihood			47.51***
Cox & Snell R square			0.673

Source: Field survey (2021);***, ** = significant at 1% (p<0.01) and 5% (p<0.05); $^{n.s}$ = not significant

Constraints of Household Consumption Choice

As posited by the respondents in Table 6; the following were critical constraints of household demand for NTFPs; high product cost (82%); poor market access (65%); scarcity of NTFPs (52%); inadequate information on NTFPs (43%); poor storage facilities (37%); consumption preferences (29%); and seasonal availability of products (15%). These factors were major barriers of household demand for NTFPs in the study area. This discovery is consistent with the findings of Asfaw *et al*., 2013; Marshall *et al*. (2003), who reported comparable outcomes.

Table 6: Distribution based on the Constraints of Household Consumption Choice for NTFPs

Constraints	Frequency*	%
High product cost	82	82

Poor access to NTFPs	65	65
Scarcity of NTFPs	52	52
Inadequate information on NTFPs	43	43
Poor storage facilities	37	37
Consumption preferences	29	29
Seasonal availability of Products	15	15

Source: Field survey (2021); * = Multiple responses.

Conclusion and Recommendations

This study analyzed the determinants of household's demand for selected NTFPs in Jos-North, Plateau State, Nigeria. The study revealed that socioeconomic factors influenced household demand for the NTFPs. Also, consumption of NTFPs was prevalent among the households; however, certain socioeconomic factors affected the quantity of demand for these products. Additionally, the respondents indicated several derivable benefits of consuming NTFPs. Further; variables in the regression model significantly influenced the quantity of demand and consumption of these products by households in the study area.

The constraints identified critically affected household demand for NTFPs; hence, improved policy formulation and implementation is required to mitigate these factors. Based on the aforementioned, the following recommendations are made: Measures that regulates and subsidizes product prices; through public-private sector interventions and incentives; as well as other stakeholder initiatives should be adopted. Efforts should be made to improve the access to NTFPs by establishing several market linkages/channels across the value chain actors; producers, retailers, sales outlets, consumers, etc. to mitigate product scarcity and price volatility. Besides, improved access to and adoption of modern extraction techniques is very vital to increase product availability and also mitigate cost of these products. Further, implementation of policies and intervention's in the forestry sector to enhance sustainable forest extraction and conservation. Increased sensitization on the health and economic benefits of NTFPs will improve knowledge on the products among households. Also, adoption of improved technology for processing and storage of NTFPs to mitigate deterioration after extraction and modify the products into more consumable forms will be very critical.

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