Income Determinant And Inequality Among Households Around National Parks In Nigeria

Jacob Daniel Etim[1*], James Akumba Ityavyar[2], Nelson Imaobong Ufot[1]

[1] Forestry and Wildlife Department, University of Uyo, Uyo, Nigeria
[2] Federal University of Agriculture, Makurdi, Nigeria

Email Address

danieljacob@uniuyo.edu.ng (Jacob Daniel Etim)
*Correspondence: danieljacob@uniuyo.edu.ng

Abstract:

This paper examines income determinants and inequality among household living around national parks in Nigeria, using household data collected through questionnaires administered randomly among the households in three national parks. The data obtained were analyzed using probability and non-probability statistical analysis such as regression and analysis of variance to test for mean difference between parks. The result obtained indicates that majority of the household heads were male (92.57%0, between the age class of 21 - 40 years (44.90%), had non-formal education (38.16%), were farmers (65.21%), owned land (95.44%), with a household size of 1 - 5 (36.67%) and an annual income range of ₦401,000 - ₦600,000 (24.58%). Also, basic household assets such as age, adult and cattle equivalents, education and land possession where significant factors (p<0.01) that affected households' income, while income inequality was location specific. The study recommends improvement in infrastructures and social capital as avenues to improve the livelihood and ensure positive conservation behaviors in the study area.

1. Introduction

In Nigeria, the forests provide various goods and services to its support zone communities, thus contributing to improvement of their livelihoods. This is also true for all protected areas [7,8,17,32,51]. These forested areas do not only provide food, medicine, fodder, building poles, among others to the support zone communities but also job opportunities, educative programs, and other community services [5,7,9,32], therefore implying their important as a source of livelihood to the local communities before its change of status to a national park. The change of these forests status coupled with a new resource governance approach (Governance by government) that

restricts the local communities access to the park resources and inadequate participation in its resource governance is believed to have impacted (negatively or positively) on their livelihood and the way they (support zone communities) relate with the park and the resources therein [23,25,28].

However, in most of these parks, Integrated Conservation and Development projects (ICDPs) have been implemented [23,24]. Projects such as the multiple use programme (MUP), agricultural development and alternative livelihoods programs that are meant to positively affect the people's incomes and in turn their livelihoods status with a view of wining their support to ensure effective resource governance [23,25,28] have been implemented. Hence, there is a need for a study to evaluate the impacts the parks have on the rural livelihood of the people in their support zone communities. This study therefore assesses the factors affecting households in the park support communities and the distribution of income among the households.

2. Materials and Method

2.1. Study Area

Nigeria is located in the western part of Africa between latitudes 4° 16'N and 13° 52'N; and between longitudes 24º 9'E and 14º 37'E (Figure 1). It occupies a total land area of 923,768 km2 with a 2014 population estimate of about 167,912,561 million people (82,098,000 females and 85,814,560 males) with a population growth of 3.2 percent [47]. By virtue of its geographical extent, Nigeria spans different climatic and ecological zones. The variable climatic conditions and physical features have consequently endowed Nigeria with a very rich biodiversity.
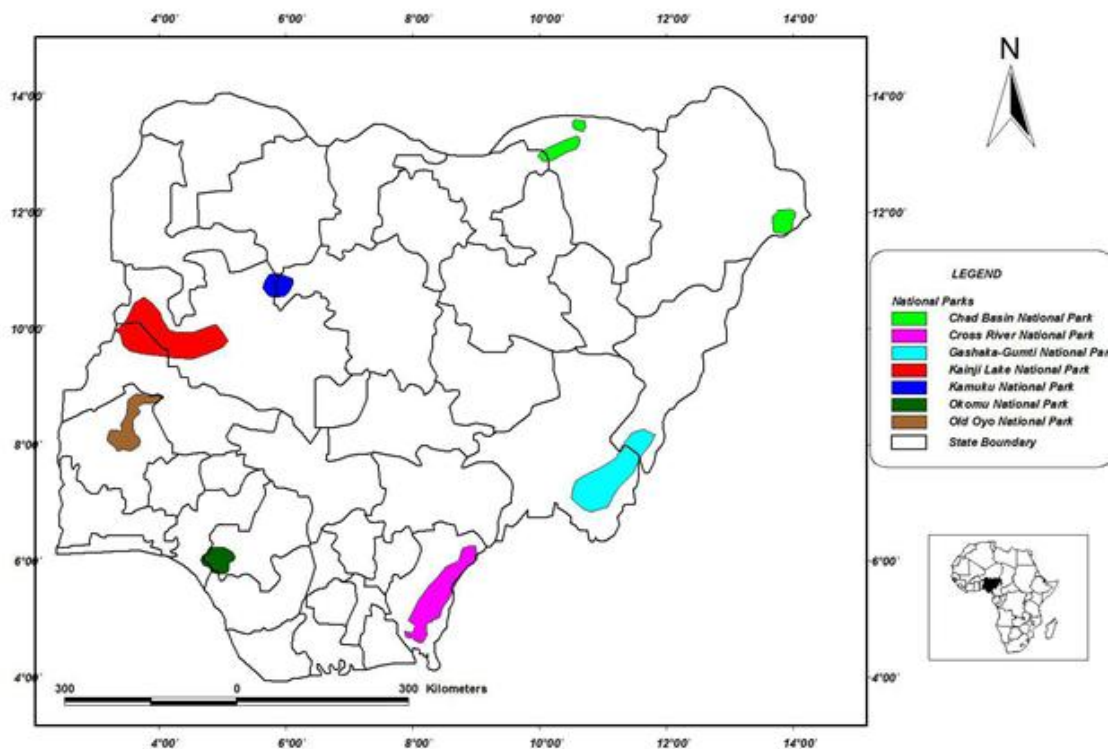

Figure 1. *Map of Nigeria showing location of national parks.*

Source: [42]

2.2. Site Selection

To ensure effective representation and selection of the National Parks in the country, the National Parks were stratified into ecological zones and from each zone, the National Park with the smallest area based on Mohammed et al. (2013) area coverage analysis of 2007 (Table 1) were selected for the study. The reason for the selection of the National Park with the smallest area in each zone is based on the observation of [62] that parks with relatively small areas have a more probability of being degraded or destroyed than those with large area coverage. From the above mention criteria for selection, the selected National Parks were Kamuku (Northern guinea/Sudan sahel savanna), Old Oyo (Southern guinea) and Okomu National Park (High forest).

Table 1. Nigerian National Parks, their ecological zones and coverage in 1995 and 2007.

National Park	State of location	Ecological zone	Area (km^2) 1995a	Area (km^2) 2007b
Chad Basin	Borno	Northern guinea/ Sudan sahel savanna	2258	2429.43
Kainji Lake	Niger, Kwara	Northern guinea/ Sudan sahel savanna	5382	3710.37
Kamuku	Kaduna	Northern guinea/ Sudan sahel savanna	1121	695.36
Gashaka-Gumti	Adamawa	Northern guinea/ Sudan sahel savanna	6731	6989.15
Old Oyo	Oyo	Southern guinea	2512	1665.14
Cross River	Cross River	High Forest	4000	2368.27
Okomu	Edo	High Forest	181	67.59

Source: [a][16]; [b][35]

2.3. Sampling Design and Data Collection

The target population of the study consists of people who were located in villages within 3km from the boundary of each of the National Parks (Table 2). Thirty percent (30%) of the villages from each park were purposively selected based on proximity to access road and from them, 20% of the household in each village were randomly selected to ensure effective comparison, variation and representativeness of the households in the geographical sub-units (villages). This is in accordance with the observation of [4,27,59].

Table 2. Sampling unit selection design.

National Park	Village sampling frame	30% sampling size (villages)	Mean household sampling frame/village	20% household sampling size/village	Total household sample per park	Total questionnaires returned per park
Kamuku	27	9	271*	54	486	463
Old Oyo	23	7	282*	56	392	369
Okomu	12	4	248*	50	200	177
Total	55	18	801	160	1078	1009

* 2006 household population census

Data collection exercise took place between August 2015 and June 2016, involving household questionnaire surveys, informant interviews and on-site data collection and inspection. A semi-structured questionnaire was randomly administered to the household heads or their representatives to gather factual data and perceptions on the

study variables. Both closed and open-ended questions were used. The questionnaire was designed and used in accordance with guidelines for questionnaire design in measuring livelihood and environmental dependence [4,50].

2.4. Data Analysis

This study will employ the use of both quantitative and qualitative data analysis techniques in the form of both probability and non-probability statistical analysis. This included the use of frequencies and measures of central tendency and dispersion, regression and analysis of variance to test for mean difference between parks.

2.5. Basic Household Assets

In order to be able to ascertain household assets comparisons of the different parks, indicators similar to those suggested by [18,7] were used. All household internal factors (access to human, social, physical and financial capital) were measured by the use of proxies such as human capital and physical capital.

2.6. Estimation of Total Income Inequality

The Gini coefficient for total income is used to compute the income inequality among the study area as recommended by [11]. The Gini coefficient for total income was calculated as

$$\frac{\sum_{i=1}^{n}\sum_{j=1}^{n}|TI_i - TI_j|}{2n^2\mu}$$

Where; μ = Mean household income, n = Total population, TI_i = Share on individual i of total household income and TI_j = share of individual j of total household income.

2.7. Determinants of Total Household Income

Ordinary linear regression (OLS) analysis will be used to estimate determinants of total household income for the study areas. In the analysis, total household income will be transformed using natural logarithms to control for variance and to ensure normality. The formula is indicated as;

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + - - - -b_{12}X_{12} + \mu$$

Where Y= total household income inequality; a = constant, bi = parameters estimates and i =1, 2...12 which are the regression co-efficient of X_i variable, X_1 = Sex of household head (Male =1 and Female = 0); X_2 = Age of household head (years); X_3 = Occupation of household head (Peasant = 1); X_4 = Distance from the market (Km); X_5 = Total land owned (hectare); X_6 = Cattle equivalent units; X_7 = Dependence on off-farm income; X_8 = Consumer worker ratio; X_9 = Dependence on park income; X_{10} = Diversity index of total income; X_{11} = Adult equivalent units; X_{12} = Household education (years) and μ = factors that were not adequately accounted for but contributes to total household income inequality.

3. Results and Discussion

3.1. Demographic Characteristics of Sampled Households

The result in Table 3 indicates the socio-economic characteristics of the respondents (N = 1009). Households headed by male (311.33±158.94, N = 934) were significantly (t = 3.23, p<0.05, df =2) different from households headed by the female

(14.67±25.40, N = 75). This is an indication that majority (92.57%) of the households had an elderly man to dictate the affairs in each family. This is in accordance with [43,44,45] observation that majority of the rural households in Nigeria are headed by male. The male dominance in the study area still subscribes to the patriarchal view that men provide for the family and have the power and authority to control the general affairs of the household unit, including decision-making [54].

Table 3 also indicates that there existed significant (F = 3.53, p<0.10), variation among the age classes. Majority (44.90%, M = 151.00±79.30, N = 453) of the sampled respondents were within the age class of 21 – 40 years, followed by those in the age class of 41 – 60 years (27.45%, M = 92.33±28.02, N = 277) and those greater than 60 years (15.56%, M = 52.33±25, N = 157), while those belonging to less than 20 years were the least (12.09%, M = 40.67±26.54, N = 122). The result implies that majority of the respondents are in their prime, hence, they are in their economically active and productive age [26,28,39,40,54].

Level of education did not vary significantly (F = 1.54, p>0.05) among the households. However, majority of the household heads in the study area had non-formal education (38.16%, M = 128.33±108.25, N = 385), followed by secondary (27.65%, M = 93±26.89, 279), primary (24.28%, M = 81.67±12.66, N = 245) and the least was tertiary education (9.91%, M = 33.33±8.74, N = 33.33±8.74). In general, it could be said that more than 61.84% of the household heads in the study area were literate and had acquired various forms of formal education with an average number of years spent in school being 6.696 years. This schooling years falls under post primary level of education. This schooling year is higher than 4.89 years reported for most of rural households in Uganda [7,60]. The high literary rate in the study area agrees with [28,43,46,54] that majority of the households in the rural areas in the country have had formal education, which according to [28] has the potential for making up of some of the deficiency in non-formal education and positively influencing the adoption of innovation. With their level of education, the respondents possess the ability to participate effectively in resource management decisions of the park to ensure sustainable conservation of the park resources while also meeting the needs of their households [14].

Occupationally, there existed significant (F = 5.70, p<0.01) difference between the households in the study area. Farming was their main occupation in the study area (65.20%, M = 219.33±142.59, N = 658). This is followed by trading (21.07%, M = 70.67±49.10, N = 212) and studentship (3.17%, M = 10.67±3.51, N = 32), while Nurse/Traditional birth attendant (0.39%, M = 1.33±1.52, N = 4) was the least occupation practiced by the sampled respondents. The high rate of farming household in the study area is in accordance with the observations of [7,12,45,58] that agriculture is the dominant livelihood activities of rural communities.

Ownership of land by households were significantly (t = 2.69, p<0.10, df =2) different from those households who did not own land (= 321.00±171.13, N = 963, vs. = 15.33±26.59, N = 46). This implies that majority (95.44%) of the households had possession of land in the study area. This agrees with the observation of [7] that land possession is usually location specific, hence majority of people living in the rural area are more likely to own land than those in the urban areas.

Number of land owned by a household also varied significantly (F = 7.41, p<0.05) in the study area. Majority of the respondents (78.29%, M = 251.33±136.88, N = 732) owned between 1 and 2 parcels of land, followed by those with 3 – 4 (4.56%, M =

60.00±31.48, N = 175), while those who owned 5 parcels of land and above (2.99%, M = 9.67±3.06, N = 28) were the least. The possession of more than one parcel of land in the study area indicates land fragmentation in the study area. This could be attributed to the practice of inheritance whereby the father apportions land among all his male children [7]. Where the family size is large, each male child is bound to inherit just a small portion of the land and may have to purchase more land to add to his inheritance so as to increase his own land holding.

The size of a household in the study area did not significantly (F = 2.95, p>0.05) differ the households. However, majority of the households in the study area had a family size of less than 5 members (36.67%, M = 123.33±42.00, N = 370), followed by those with 6 – 10 members (31.42%, M = 105.67±38.50, N = 317) and the household with more than 15 members was the least abundant (12.48%, M = 42.00±30.51, N = 126). The result agrees with the observation of [29,45] and [46] who reported that rural areas are characterized by large family sizes ranging between 1- 20 members per household. This could probably be as a result of the polygamous nature of most male-headed households in the study area [45].

Also, among the household, there was no significant (F = 0.94, p>0.05) difference between the various income classes in the study area. The distribution of annual income in the study area indicates that most (24.58%, M = 82.67±24.84, N = 248) of the households earn between ₦401,000.00 and ₦600,000.00 while those who earn between ₦801,000.00 and ₦1,000,000.00 were the least (10.80%, M = 36.33±11.59, N = 109). However, only 15.07% (M = 50.67±38.53, N = 152) of the households in the study area was able to earn an income of more than a million naira (>₦1,000,000.00).

A further analysis of the income of the respondents indicates that there existed 0.358 level of income inequality among the households. This is a reduction from the 0.506 reported for the country in 1996/97 (World Bank, 2002), 0.447 in 2011 [37] and 0.441. The result (0.358) is also lower than the level of income inequality reported for rural communities in Nigeria [27,37]. The significant reduction in inequality among rural households in the study area could be attributed to location and climate which could have a larger effect on the income levels and income distribution of the households, through their effects on transport costs, disease burdens, and agricultural productivity among others. It could also the attributed to the effort of government to reduce poverty in Nigeria through poverty alleviation programmes. The reduction in income inequality in rural area is laudable because inequality is an agent that can harm social cohesion and may exacerbate conflict [1].

Table 3. Demographic characteristics of sampled respondents.

S/N	Variables		Total		Mean±SD	Significant level
			F	%		
1.	Gender	Male-headed	934	92.57	311.33±158.94a	3.23**
		Female-headed	75	7.43	14.67±25.40b	
		Total	1009	100		
2.	Age (years)	≤ 20	122	12.09	40.67±26.54a	3.53*
		21 - 40	453	44.9	151.00±79.30b	
		41 - 60	277	27.45	92.33±28.02a	
		> 60	157	15.56	52.33±25.32ab	
		Total	1009	100		

3.	Educational Status	Non-formal	385	38.16	128.33±108.25	1.45ns
		Primary	245	24.28	81.67±12.66	
		Secondary	279	27.65	93±26.89	
		Tertiary	100	9.91	33.33±8.74	
		Total	1009	100		
4.	Main occupation	Farming	658	65.21	219.33±142.59a	5.70**
		Trading	212	21.07	70.67±49.10b	
		Tailor	13	1.27	4.33±1.53b	
		Civil servant	8	0.78	2.67±3.06b	
		Teaching	7	0.68	2.33±1.53b	
		Student	32	3.17	10.67±3.51b	
		Nurse/Birth attendant	4	0.39	1.33±1.52b	
		Artisan	75	7.43	25.00±33.45b	
		Total	1009	100		
5.	Land ownership	Yes	963	95.44	321.00±171.13a	2.69*
		No	46	4.56	15.33±26.59	
		Total	1009	100		
6.	Number of parcel of land owned	≤ 2	732	78.29	251.33±136.88a	7.41**
		3 - 4	175	18.72	60.00±31.48b	
		5 and above	28	2.99	9.67±3.06b	
		Total	935	100		
7.	Household size	≤ 5	370	36.67	123.33±42.00	2.95ns
		6 - 10	317	31.42	105.67±38.50	
		11 - 15	196	19.43	65.33±37.63	
		> 15	126	12.48	42.00±30.51	
		Total	1009	100		
8.	Annual income of household head (₦0,000)	≤ 200	154	15.26	51.33±30.66	0.94ns
		201- 400	166	16.45	55.33±34.00	
		401- 600	248	24.58	82.67±24.84	
		601- 800	180	17.84	60.00±10.54	
		801– 1,000	109	10.8	36.33±11.59	
		> 1,000	152	15.07	50.67±38.53	
		Total	1009	100		

*SD = Standard deviation, ns = Not significant, ** = Significant at 5% (p>0.05), * = Significant at 10% (p>0.10)*

Mean with similar alphabet means they are not significantly different

3.2. Basic Household Assets

The result in Table 4 indicates a significant difference (F (2, 1008) = 12.892, p< 0.01) in the age of the family head among the three parks. The mean age of the household head ranged between 36.602 years (Old Oyo) and 41.121 years in Kamuku National Parks. The age of households' head in Kamuku was significantly different from the other two parks, while the age of household's head in Okomu and Old Oyo were not significantly different from each other. All the sample households had a

mean age of 38.725 years. This is an indication that the respondents are in their economically active and productive age bracket. This agrees with the observation of [26,28,38] and [54] that most of the support zone communities around the forest areas in Nigeria are young and actively engaged in forest livelihood activities.

The three parks differed significantly in respect to adult equivalent (F (2, 1008) = 44.510, p< 0.01). Kamuku National Park had the highest adult equivalent unit (8.992) followed by Old Oyo (7.405) and least (5.415) by Okomu National Park. A further test on the mean value indicates that the adult equivalent unit value for Kamuku was significantly different from that of Okomu and Old Oyo National Parks but there was no significant difference between the adult equivalent score for Okomu and Old Oyo National Parks (Table 4). The high adult equivalent of households in Kamuku could be attribute culture, religion and occupation of the people. Polygamous families abound in the northern part of the country than other parts of the country therefore contributing to a larger household size which translate to higher equivalent unit. Also, a mothers' age at first birth, number of siblings, educational status, locality, sex of household head, wealth index, religion and mother's working status contribute to increased adult equivalent unit of households in Kamuku [3].

Another important asset noted is livestock. A large profile of different livestock was kept by households. On average, households possessed 1.238 cattle equivalent units of livestock (Table 4). There exists significant difference (F (2, 1008) = 34.805, p< 0.01) among the parks and Kamuku households owned more livestock (1.871) compared to Okomu (0.327) and Old Oyo (0.850). The high cattle equivalent units of households in Kamuku could be attributed to the large number of ruminant animals especially cow kept by households compared to other parks. This observation is in agreement with [33], who reported that larger proportions of cows are largely concentrated in the northern region of the country than the southern region. The region produces about 90 percent of the country's cattle population and 70 percent of the sheep and goat populations of the country [33]. Moreover, the southern part of the country is generally not suitable for livestock husbandry especially cattle due to diseases, heavy rains and shortage of land. Though some households owned livestock (goat, sheep and poultry), it is not a major livelihood activity.

There exists significant difference (F (2, 1008) = 4.616, p< 0.05) between the years of education of households among the parks (Table 3). Household heads in Old Oyo had the highest schooling years (7.626) followed by Okomu (7.162) and Kamuku had the least schooling year (6.376). However, the average number of years in school for all the household head was 6.696 with more that 60% of the households' head acquiring formal education. This schooling years falls under post primary level of education. The level of schooling years in the study area is higher than 4.89 years reported for most of rural households in Uganda [7,60]. The literary rate in the study area agrees with [28,43,46] and [54] that majority of the households in the rural areas in the country have had formal education.

All households in the study area had access to land with a mean of 1.894 parcels of land. However, there were significant differences (F (2, 1008) = 2.082, p< 0.05) among the parks. Kamuku had the highest parcel (1.970) of land owned, followed by Old Oyo (1.894), while Okomu had the smallest number of land owned (1.817). The variation in number of land possessed by households among the parks could be attributed to the fact that the respondents are located in remote location and with varied age of households. This is in accordance with [7] observation that land

possession in the rural area is related to location and household age. Moreover, the possession of more than one parcel of land in the study area indicates that there is a lot of land fragmentation in the study area. This could hinder the household productivity due to travel time between land parcels [41] and the fact that the parcels are usually too small to facilitate any intensive agriculture. Fragmentation in the study areas could also be due to the practice of inheritance whereby the father apportions land among all male children [24]. When the family size is large, each male child is bound to inherit just a small portion of the land and may have to purchase more land to increase his own land holding.

Table 4. Basic Household Assets in the study area.

Variable	Kamuku (n = 463) Mean (std dev)	Okomu (n = 177) Mean (std dev)	Old Oyo (n = 369) Mean (std dev)	Total (N = 1009) Mean (std dev)	F statistic	p-value
Household Age	41,121[a] (12.007)	36.881[b] (13.884)	36.602[b] (15.773)	38.725 (13.981)	12.892	0.000***
Adult Equivalent	8.992[a] (5.570)	5.415[b] (3.301)	6.369[c] (5.031)	7.405 (5.254)	44.510	0.000***
Cattle Equivalent	1.871[a] (3.191)	0.327[b] (0.458)	0.850[c] (1.376)	1.238 (3.191)	34.805	0.000***
Household Head Education	6.376[a] (5.871)	7.152[b] (6.107)	7.626[b] (6.006)	6.696 (5.983)	4.616	0.010**
Land Possession	1.970 (1.403)	1.817 (1.348)	1.821 (1.350)	1.894 (1.124)	2.082	0.125**

Means with the same superscript (a, b, c) implies no significant difference between them

*** = significant at p<0.01, ** = significant at p<0.05

3.3. Income Inequality Among the Study Area

Gini coefficient gives the overall picture of the level of inequality and wellbeing of the people in a community. The Gini coefficient of the sample households in the three National Parks are presented in Figure 2. The result shows that households in Okomu National Park had the highest (0.3685) income inequality followed by households in Kamuku National Park (0.3604) and the least was households in Old Oyo National Park (0.3482). In general, the income inequality in the study area was 0.3583.

The use of Gini coefficient in the study evaluate income inequality among the households helps to gives the overall picture of the level of inequality and wellbeing of the people in a community [7,11,27]. The Gini coefficient of the sample households in Okomu (0.369) and Kamuku (0.360) is lower than 0.411and 0.384 recorded for Edo and Kaduna State respectively in 2012. However, the 0.348 Gini coefficients of households in Old Oyo were higher than 0.328 also recorded for households in Oyo State in 2012. The result implies that income inequality is geographical and location specific, thus even within the same State or region there exist variations in income distribution among the households.

This scenario depicts that policies toward poverty alleviation should be highly localized for it to achieve better results that would serve as a pathway out of poverty for the rural poor households [27]. However, the introduction of alien livelihood strategies/activities without localizing and improving on the already existing once

should be discourage as it would take time be adapted by the households therefore making them more vulnerable to poverty [2,20].

In general, the total sampled households in all the three National Parks had a 0.358 level of income inequality. This is a reduction from the 0.506 reported for the country in 1996/97 [63], 0.447 in 2011 [36] and 0.441 [27]. The result (0.358) is also lower than the level of income inequality among rural communities in Nigeria [27,37]. The significant reduction in inequality among rural households in the study area could be attributed to location and climate which could have large effects on income levels and income distribution, through their effects on transport costs, disease burdens, and agricultural productivity among others. It could also the attributed to the effort of government to reduce poverty in the country. The reduction in income inequality in rural area is a laudable because inequality is an agent that can harm social cohesion and may exacerbate conflict. There is a general consensus in literatures that high levels of income inequality can, if unchecked, ferment internal conflict as a result of disparity in regional development.
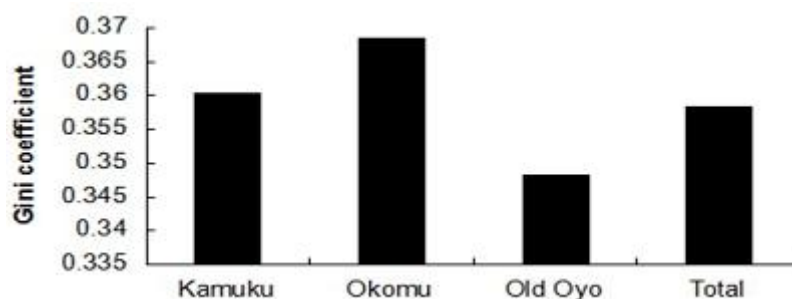

***Figure 2.** Income inequality in the study area.*

3.5. Determinant of household income

The results in Table 5 indicates that the regression coefficient of multiple determination (R^2) value was 0.807, implying that all the variables included in the model explained about 80.70% of the variations in income among the households in the studied area. The F-Statistic of 349.23 was highly significant at ($p < 0.01$), thus indicating that the variables included in the model had a positive impact on the total income earned by households the study area.

Among the household characteristics that influence household total annual income, age ($p<0.05$), total land owned ($p<0.01$), Household size ($p<0.10$), gender of household head ($p<0.01$), income diversification ($p<0.01$), occupation of household head ($p<0.01$) and adult equivalent units ($p<0.01$) were found to be significant with positive coefficient. The size of land holding determines the returns to agriculture-based livelihoods [31,7]. Together with labor, land is important in rural productivity and usually may represent the only variable input into agriculture production [7]. Therefore, households with more land holding are more likely to have higher incomes as considering that there is a high dependence on agricultural incomes in the study area. This is in accordance with studies of [7] and [31] in rural Kenya and Uganda that increase in land holding positively correlate with household's per capita income.

The significant contribution to household size (61101.61, $p<0.1$) to total income in the study area is in accordance with the observation of [6] who also found household size to be positive and contributed significantly to the total household income in rural

farm households in Kwara State. Thus, households with a large proportion of working members can pool incomes to obtain increase household income [7].

Table 5. Linear regression of determinants of total household income.

Variables	Coefficients	Standard Error	P-value
Intercept	-1416027	279540.20	0.00***
Age	6771.804	2938.94	0.02**
Farm dependence	-8438.52	2398.52	0.00***
Off-farm dependence	-9156.19	2359.73	0.00***
Land	142737.50	14004.77	0.00***
HH Education	-14836	7231.66	0.04**
Household size	61101.61	12579.55	0.00***
Gender	1041534	161011.80	0.00***
Diversity index	1560557	187380.9	0.00***
Occupation	329795	5935.517	0.00***
Adult Equivalent	32705.83	3938.282	0.00***
Cattle equivalent	-2013.91	18443.13	0.91
Size of farm	-380.734	4941.497	0.94

*$R^2 = 0.807$; R^2 Adjusted = 0.805; F = 349.23***, N = 1009*

*** = significant at p<0.01, ** = significant at p<0.05, * = significant at p<0.1

Gender of the household in the study area contributed positively and significantly (1041534, p<0.01) to the household income in the study area. This implies that with more male headed households, the income of the households will increase accordingly. Female household heads negatively affected household income. This may be explained by the fact that most of female household heads were poor, widowed and old women and where less productive than their male counterparts. This result contradicts the observation of [27] that gender is not a determining factor of household poverty and income level.

The positive and significant contribution of income diversification (1560557, p<0.01) in total household income agrees with [21] that income diversification is a risk management and coping strategy to cushion the effects of economic hardship, thus improving household income. Studies by [10,15,22,34,52] and [55] also reported that in less developed countries, more than 60% of its workforce engaged in multiple occupations with the aim of diversifying their income sources to help them cushion the effects of economic and agro-climate shocks, poverty reduction, reduction in income inequality, consumption stability and overall improvement in the standard of living of the households. While diversification is believed to have a negative effect on income [61], it can be used to increase current consumption and in the short run may have a positive effect on household income [7].

The occupation of household head was positive and significantly (329795, p<0.01) contributed to the diversification of household income. This implies that the type of work the household does will determine the household income and the need for diversification to earn more income. This observation agrees with [56] conclusion that the average wage incomes of regular wage/salaried workers would be higher than those received by the casual laborers (agricultural and non-agricultural) and also

higher than incomes of self-employed with asset base [49], thus influencing their willing to diversify their income sources. Also, a study in Cote d'Ivoire conducted by [19] on households found that expenditure patterns varied with the share of income generated by the wife. For a given level of household income, as the wife's share of income increased, expenditures on food increased and expenditures on cigarettes and alcohol decreased. [53] found that the non-earned incomes of husbands and wives had different effects on family labor supply decisions in Thailand. The distribution of income between husbands and wives also appears to have important consequences for the welfare of children. Also, [57] showed that in Brazil the non-earned income of the mother had a much larger positive effect on indicators of children's health than did the non-earned income of the father.

The positive and significant adult equivalent (32705.83, p<0.01) in the study agrees with [7] observation that higher adult equivalent units positively affected household income. This is because households with more adults have more labor force for both on-farm and off-farm employment. This therefore increases household agriculture productivity since family labor is an important input in agriculture in rural areas [7]. Also, having more adult equivalent units in a household also increased the chances of engaging in an off-farm employment which in turn leads to higher household income due to high returns from off-farm employment [6,13,30,31].

4. Conclusion

The study was set to determine the factors affecting rural income and its distribution among households around national parks in Nigeria. The study concludes that ecological zone or location of the park did significantly affect asset endowment among households and there also existed factors such as age, dependence and gender that significantly affected the income of a household thereby causing inequality among the households in the study area. The study therefore recommends that efforts should be to improve the livelihood of the park support zone communities considering that most of them inherently have access to land asset and low off-farm employment opportunities. This will involve putting in place policies and programmes that will help ameliorate the negative effects the park has on the households as it will go a long way in enhancing households' levels of productivity and incomes. Also access to credit facilities should be improved upon by establishing micro credit institutions and loan schemes that are tailored to benefit the rural people within the park vicinity. The same should be done elsewhere across the country with similar problems as it would further contribute to poverty reduction in rural areas, thus creating a clear path way out of poverty.

Conflicts of Interest

The authors declare that there is no conflict of interest regarding the publication of this article.

Funding

References

[1] Adegoke, Y.O. Disparity in income distribution in Nigeria: a Lorenz curve and Gini index approach. *Universal Journal of Management and Social Sciences,* 2013, 3(7), 16-30.

[2] Adewunmi, O.I.; Adesimi, B.; Ezekiel, O.A. Non-farm Activities and Poverty among Rural Farm Households in Yewa division of Ogun State, Nigeria. *Journal of Social Science,* 2011, 26(3), 217-224.

[3] Amusa, L.; Yahya, W.B. On Determinants of Ideal Family Size in Nigeria: A Stepwise Bayesian Regression Modeling Approach. Paper presented at the Conference of the U6 Held between 6th-10th September, 2015 at the University of Ilorin.

[4] Angelsen, A.; Larsen, H.O.; Lund, J.F.; Smith-Hall, C.; Wunder, S. Measuring Livelihood and Environmental Dependence: Method for research and fieldwork. Earthscan. 2011; pp. 264.

[5] Azeez, I.O.; Aiyedun, O.J. Gender Role in the Management, Conservation and utilization of Non-Timber Forest Products (NTFPs): A case study of Gambari Foerst Reserve, Oyo State. In: P. C. Obiaga, Abu, J. E., Popoola, L. and Ujor G. (eds.) Conservation of Nigeria's Natural Resources and the Threatened Environment: Proceedings of the 26th Annual Conference of the Forestry Association of Nigeria (FAN), 19TH – 23rd April, 1999. FAN National Secretariat, Federal Department of Forestry, P. O. Box 4185, Ibadan, 1999; pp. 218-223.

[6] Babatunde, R.O. Income Inequality in Rural Nigeria: Evidence from Farming Households Survey Data. *Australian Journal of Basic and Applied Science,* 2008, 2(1), 134-140.

[7] Balikoowa, K. Impacts of Bwindi Impenetrable National Park on local peoples' livelihoods. Ås. IX bl., 2008; pp. 72.

[8] Blom, A. Ecological and Economic Impacts of Gorilla-Based Tourism in Dzanga-Sangha, Central African Republic, Doctoral Thesis, Wagenigen University, Wagenigen, Netherlands. 2001, vi + 164p.

[9] Campbell, A.C. Utilization of Wildlife in Botswana from Earliest times to AD 900. In: The Present Status of Wildlife and its Future in Botswana, pp.45-67, Kalahari Conservation Society and Chobe Wildlife Trust Symposium/Workshop. Gaborone, 1995.

[10] Castells, M.; Portes, A. World Underneath: The Origins, Dynamics and Effects of the Informal Economy. In: Portes, A., M. Castells and L. A. Benton (eds.). *Baltimore the Informal Economy: Studies in Advanced and Less Developed Countries*, The Johns Hopkins University Press, 1989; pp. 11-41.

[11] Cheong, K.S. A Note on the Interpretation and Derivation of the Gini coefficient, Department of Economics Working Paper Series No. 99-1, University of Hawaii at Manoa, 1999.

[12] Chianu JN, Tsujii H, Kormawa P. Agriculture in the savannas of northern Nigeria: Pressures, transformation, damage and coping strategies. *Outlook on Agriculture,* 2004, 33(4), 247-253.

[13] De Janvry, A.; Sadoulet, E. Investing in Rural Development is Good Business; In R. Echeverr (ed.), Development of Rural Economies; Inter-American Development Bank. Washington, DC., 2001.

[14] Emelue, G.U.; Ukandu, M. Perception of Host Communities toward the Implementation of Park Laws in Okomu National Park. *Journal of Research in Forestry Wildlife and Environment,* 2014, 6(2).

[15] Ersado, L. Income Diversification in Zimbabwe: Welfare Implications fromUrban and Rural Areas, World Bank Policy Research Working Paper No. 3964, 2006.

[16] FORMECU. An Assessment of Land use and vegetation changes in Nigeria 1978 - 1995. Geomatis, Ontario, Canada, 1995.

[17] Getzner, M.; Jungmeier, M. Conservation Policy and the Regional Economy: The Regional Economic Impact of "Natura 2000" Conservation Sites in Austria. *Journal for Nature Conservation,* 2012, 10(1), 25-34.

[18] Hayati, D.; Karami, E.; Slee, B. Combining Qualitative and Quantitative Methods in the Measurement of Rural Poverty: The Case of Iran. *Social Indicators Research,* 2006, 75(3), 361-394.

[19] Hoddinott, J.; Haddad, L. Does Female Income Share Influence Household Expenditures? Evidence from Cote d'Ivoire. *Oxford Bulletin of Economics and Statistics,* 1995, 57, 77-96.

[20] Igbalajobi, O.; Fatuase, A.I.; Ajibefun, I. Determinants of Poverty Incidence among Rural Farmers in Ondo State, Nigeria. *American Journal of Rural Development,* 2013, 1(5), 131-137.

[21] Ijaiya, G.; Ijaiya, R.A.; Bello, M.; Ijaiya, A. Income Diversification and Household Well-Being in Ilorin Metropolis, Nigeria. *International Journal of Business Management Economics and Information Technology,* 2009, 1(1), 1-12.

[22] Ijaiya, G.T.; Chika, A.U. The Informal and Formal Sector Interlinkages and the Incidence of Poverty in Nigeria: A Case Study of Ilorin Metropolis. *Africa development*, 2004, 29(3), 84-102.

[23] Jacob, D.E. Buffer zone management in Cross River National park: Oban division. Undergraduate Research, University of Uyo, Uyo. 2008; pp. 66.

[24] Jacob, D.E. Resource Governance Structure in selected Nigeria National Parks and Impact on Rural Livelihood. Ph.D thesis submitted to Federal University of Agriculture, Abeokuta, Nigeria. 2017; pp. 2546.

[25] Jacob, D.E.; Ogogo, A.U. Community Participation in Protected Area Management: A Case Study of Cross River National Park. In: Popoola, L., K. Ogunsanwo and F. Idumah (eds). Forestry in the Context of the Millennium Development Goals, Proceeding of the 34th Annual Conference of the Forestry Association of Nigeria held in Osogbo, Osun State, Nigeria. 2011, 1, 412-415.

[26] Jacob, D.E.; Nelson, I.U.; Udoakapn, U.I.; Etuk, U.B. Wildlife Poaching in Nigeria National Parks: A Case study of Cross River National Park. *International Journal of Molecular Ecology and Conservation,* 2015, 5(4), 1-7.

[27] Jacob, D.E.; Udeagha, A.U.; Nelson, I.U. Poverty Incidence among Rural Households in Ikot Ondo Community, Nigeria. *Journal for Studies in Management and Planning,* 2016, 2(5), 80-88.

[28] Jacob, D.E.; Udoakpan U.I.; Nelson, I.U. Issues in Conflict Resolution in Cross River National Park, Southeastern Nigeria. 1st International Conference on Environmental Crisis and its Solution. Scientific and Research Branch,

Khouzeslan, Islamic Azad University, Kish Island, Iran, 13th-14th February, 2013. 2013; pp. 76-82.

[29] Javed, Z.H.; Asif, A. Female households and poverty: A case study of Faisalabad District. *International Journal of Peace and Development Studies,* 2011, 2, 37-44.

[30] Karugia, J.T.; Oluoch-Kosura, W.; Nyikal, R.; Odumbe M.; Marenya, P.P. Access to Land, Income Diversification and Poverty Reduction in Rural Kenya. Paper delivered at the International Association of Agricultural Economists Conference, Gold Coast, Australia, August, 2006; pp. 12-18.

[31] Karugia, J.; Oluoch-Kosura, W.; Nyikal, R.; Odumbe, M.; Marenya, P. The Role of Rural Factor Markets in Reducing Poverty, Risks and Vulnerability in Rural Kenya: The Case of Kakamega and Vihiga Districts. SAGA Brief, 2005.

[32] Kibirige, R. The socio-economic impacts of tourism on poor rural communities: the Mpembeni community, Hluhluwe-Umfolozi Park, Kwazulu-Natal, South Africa. *Africa Insight,* 2003, 33(1), 23-28.

[33] Lawal-Adebowale, O.A. Dynamics of Ruminant Livestock Management in the context of the Nigerian Agricultural System. Available online: https://www.intechopen.com/books/livestock-production/dynamics-of-ruminant-livestock-management-in-the-context-of-the-nigerian-agricultural-system (accessed on 8 October 2016).

[34] Minot, N.; Epprecht, M.; Tram Anh, T.T.; Trung, L.Q. Income Diversification and Poverty in the Northern Uplands of Vietnam. Research Report Abstract 145. International Food Policy Research Institute (IFPRI), Washington D.C., 2006.

[35] Mohammed, S.O.; Gajere, E.N.; Eguaroje, E.O.; Shaba, H.; Ogbole, J.O.; Mangut, Y.S.; Kolawole, I.S. Spatio-temporal analysis of the national parks in Nigeria using geographic information system. *IFE J Sci,* 2013, 15(1), 159-166.

[36] National Bureau of Statistics (NBS). Nigeria Poverty Profile 2010. Abuja, 2012; pp. 31. Available online: http://www.nigerianstat.gov.ng/pdfuploads/Nigeria%20Poverty%20Profile%202010.pdf (accessed on 8 October 2016).

[37] National Bureau of Statistics. (NBS, 2011). NBS press briefing on Nigeria poverty profile 2010 report. Available online: www.nigerianstat.gov.ng (accessed on 15 January 2016).

[38] Nelson, I.U. Economic Analysis Small Scale Ornamental Plants Production and Marketing in Akwa Ibom State, Nigeria. Unpublished M. Sc Dissertation, University of Uyo, Akwa Ibom State. 2015; pp. 148.

[39] Nelson, I.U.; Udo, E.S.; Jacob, D.E. Profitability of ornamental plant business in Akwa Ibom State, *Nigeria. Eurasian Journal of Forest Science,* 2018, 6(1), 35-43.

[40] Nelson, I.U.; Udo, E.S.; Jacob, D.E. Economic analysis of firewood marketing in Uyo capital city, Akwa, Ibom state, Nigeria. *Eurasian Journal of Forest Science*, 2017, 5(2), 26-43.

[41] Niroula, G.S.; Thapa, G.B. Impacts and Causes of Land Fragmentation, and Lessons Learned from Land Consolidation in South Asia. *Land Use Policy,* 2005, 22, 358-372.

[42] Ogunjinmi, A.A.; Onadeko, S.A.; Adewumi, A. A. An Empirical Study of the Effects of Personal Factors on Environmental Attitudes of Local Communities

around Nigeria's Protected Areas. *The Journal of Transdisciplinary Environmental Studies,* 2012, 11(1), 40-53.

[43] Olawuyi, S.O.; Adetunji, M. O. (), Assessment of Rural Households Poverty in Nigeria: Evidence from Ogbomoso Agricultural Zone of Oyo State, Nigeria. *Journal of Scientific Research and Reports,* 2013, 2(1), 35-45.

[44] Olayide, O.E.; Alene, A.D.; Ikpi, A. Determinants of Fertilizer Use in Northern Nigeria. *Pakistan Journal of Social Sciences,* 2009, 6(2), 91-98, 2009.

[45] Olorunsanya, E.O.; Omotesho, O.A.A. Gender Analysis of Poverty among Rural Farming Households in North Central Nigeria. *European Journal of Social Sciences,* 2012, 28(3), 366-376.

[46] Oluwatusin, F.M.; Sekumade, A.B. Farm Households Income Sources Diversification Behavior in Nigeria. *Journal of Natural Sciences Research,* 2016, 6(4), 102-111.

[47] Oyedele, D. Nigeria's Population Now 168m, Hits 221m in 2020. ThisDayLive.Com. Available online: http://www.thisdaylive.com/articles/nigerias-population-now-168m-hits-221m-in-2020/101436/ (accessed on 17 October 2014).

[48] Population and Housing Census, Economic characteristics. October 2006, Kampala, Uganda.

[49] Reddy, A.A.; Kumar, P. Occupational Structure of Workers In Rural Andhra Pradesh. *Journal of Indian School of Political Economy,* 2006, 18(1 and 2), 77-91.

[50] Rubin A, Babbie ER (eds.) Research Methods for Social works. Sixth edition. United State: Thomas Brooks/Cole. 2008; pp. 668.

[51] Scherl, L.M.; Alison, W.; Robert, W.; Jill, B.; Phil, F.; Jeffrey, A.; McNeely.; Thomas O. McShane. *Can Protected Areas Contribute to Poverty Reduction? Opportunities and Limitations.* IUCN, Gland, Switzerland and Cambridge, UK. 2004, viii + 60pp.

[52] Schgtman, A.; Berdegue, J.; Modrego, F. Income Diversification through Agricultural Development, 2006. Available online: www.rimisp.org/getdoc.php (accessed on 17 October 2014).

[53] Schultz, T.P. Testing the Neoclassical Model of Family Labor Supply and Fertility. *Journal of Human Resources,* 1990, 25, 599-634.

[54] Silver, O.C.; Kelechi, O.C.; Ogbonna, E.C. Comparative analysis of expenditures of male-headed and female-headed cassava-based farm households in Umuahia agricultural zone of Abia State, Nigeria. *Journal of Economics and Sustainable Development,* 2015, 6(24), 135-143.

[55] Soares, R.R. Mortality Reductions, Educational Attainment, and Fertility Choice. *American Economic Review,* 2005, 95(3), 580-601.

[56] Sundaram, K. Employment and Unemployment Situation in the Ninetres: Some Results from NSS 55th Round Survey, Econtsntic und Politicul Weekly, Yol. XXXVI, No. ll, 2001, March 17.

[57] Thomas, D. Intra-household resource allocation: An inferential approach. *Journal of Human Resources,* 1990, 25, 635-664.

[58] Tumusiime, D.M. Protected Areas and people in Uganda: Costs, benefits, livelihoods and narratives around Bwindi Impenetrable National Park. MSc thesis submitted to the Norwegain University of Life Science, 2006; pp. 125.

[59] Udeagha, A.U. Impact of Climate Change on the contribution of Irvingia fruits and kernels to rural household economy in Cross River State, Nigeria. Unpublished M.Sc Thesis submitted to University of Uyo, Nigeria, 2015; pp. 175.

[60] Uganda Bureau of Statistics. Uganda Bureau of Statistics: The 2002 Uganda

[61] Vedeld, P.; Angelsen, A.; Sjaastad, E.; Kobugabe, B.G. Counting on the Environment: Forest Incomes and the Rural Poor. Environment Economics Series Paper 98. World Bank, Washington D.C., 2004.

[62] Wells, M.; Brandon, K.E.; Hannah, L. People and parks: Linking protected area management with local communities. Washington, DC: World Bank, 1992.

[63] World Development Report. Agriculture for Development. Washington DC: World Bank, 2007. Available online: https://openknowledge.worldbank.org/handle/10986/5990 (accessed on 17 October 2014).