Determinants of Income Diversification among Support Zone Communities of Nigeria National Parks

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Abstract: This paper examined determinants of income diversification among households in support zones communities of national parks in Nigeria. This involved the use of household data collected through questionnaires administered randomly among 1009 household heads in the study area. 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 the majority of household heads were male (92.57% between the age group of 21-40 years (44.90%), had non-formal education (38.16%), were farmers (65.21%), owned land (95.44%), with the household size of 1-5 (36.67%) and an annual income range of ₦401,000 - ₦600,000 (24.58%). Mean Simpson index of diversity showed a general low (0.375) level of income diversification among the households. Income, age, off-farm dependence, education, household size and occupation where significant ($p<0.01$) factors that affected households' income diversification. The study recommends improvement in the existing infrastructures and social capital in the communities as avenues to improve the livelihood and ensure positive conservation behaviors in the study area.

1. Introduction

The impacts of protected areas on rural livelihood is a widely debated issue especially in developing countries (Adams *et al*. 2004; Adams and Hutton 2007; Roe 2008; Clement *et al*. 2014). Accordingly, most of these studies believed that the costs of protected areas (PAs) are borne by the local people (Adams and Hutton, 2007; Cernea and Schmidt-Soltau 2006), hence,

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their diversification of household income sources to improve their livelihoods. These strategies enable them to manage risk, meet household consumption needs and to respond to diseconomies of scale (Minot *et al.* 2006).

Income diversification among rural household involves strategically allocating their productive assets among different income generating activities (Abdulai and CroleRees, 2001). In Sub-Saharan Africa, income diversification is increasingly becoming important among rural households due to its positive impacts on household incomes, wealth, consumption and nutrition (Barrett *et al*. 2001; Haggblade *et al*. 2007; World Bank 2007).

In Nigeria, studies such as DFID (2004), Okali *et al*., (2001), Adebayo *et al*. (2001) and Jacob (2017) have demonstrated that income diversification contribute significantly to improving livelihood of the rural communities. However, there exit paucity of information on income diversification strategies and factors that influences it on support zone communities of Nigeria National Parks. Therefore, this study will be of interest to policy makers especially the park management committees as it provides information that will help to improve the livelihood of these communities, thus, reducing poverty and spurring economic growth in the area.

2. Materials and methods

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 (Oyedele, 2014). 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.

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Figure 1: Map of Nigeria showing location of the national parks
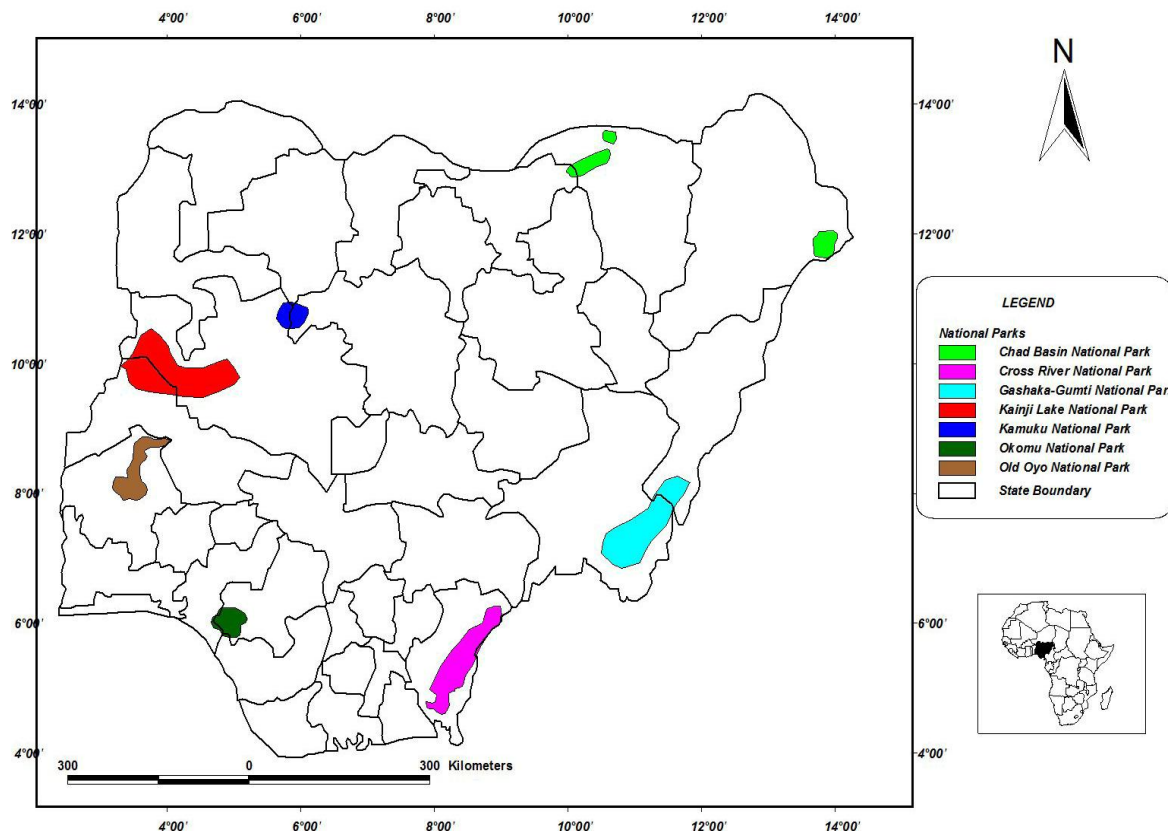
Source: Ogunjinmi *et al*. (2012)

2.2 Site Selection

The National Parks in Nigeria were stratified into ecological zones and the park with the smallest area from each zone were selected for the study (Table 1). The selection was based on its probability of being degraded or destroyed (Well *et al*., 1992). 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 (km²) 1995a	Area (km²) 2007b
Chad Basin	Borno	Northern guinea/ Sudan sahel savanna	2258	2429.43
Kainji Lake	Niger, Kwara	Northern guinea/ Sudan sahel savanna	5382	3710.37

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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]FORMECU, 1995; [b]Mohammed *et al*., 2013

2.3 Sampling design and data collection

Thirty percent (30%) of the villages located within 3km from the boundary of each of the National Parks were purposively selected based on their proximity to access road for the study. Also, 20% of the household in each village were randomly selected to ensure effective comparison, variation and representativeness of the households as described by Angelsen *et al*. (2011) and Jacob *et al*. (2016).

Data collection was conducted between August 2015 and June 2016, using questionnaire, interviews and on-site data collection and inspection. The semi-structured questionnaires were randomly administered among household heads or their representatives to obtain data. The questionnaire was designed and used in accordance with guidelines for such a study (Rubin and Babbie 2008; Angelsen *et al*., 2011).

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/ 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

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2.4 Data analysis

This study employs the use of both quantitative and qualitative data analysis techniques in the form of descriptive analysis, T-Test, ANOVA, the Simpson Index of Diversity used in measuring income diversity and a multiple regression analysis in determining the factors that influenced income diversification in the study area.

Following Ersado (2006) and Kaija (2007), the determinants of overall diversity were estimated using standard Ordinary Least Squares (OLS) estimation. The OLS specification is as follows.

2.5 Estimating the degree of household income diversification

The Simpsons Index of Diversity (SID) was used in estimating the degree of income diversification among households in the park support zone communities. The approach takes into consideration both the number of income sources as well how evenly the distributions of the income between the different sources are (Senyo *et al*., 2015; Minot *et al*., 2006). The index ranges between 0 and 1, thus, 0 denotes specialization and 1 – the extremity of diversification. The SID equation as used by Senyo *et al*. (2014) is given as:

$$SID = 1 - \sum_{i=1}^{n} P_i^2 \quad - \quad - \quad - \quad - \quad - \quad - \quad \textbf{(Eqn. 1)}$$

SID=Simpsons Index of Diversity, *n* = number of income sources, *Pi* = Proportion of income coming from the source *i*, the value of SID ranges from zero (0) to One (1); however, if there is only one Source of Income, P*i* = 1, then SID = 0.

2.6 Estimation of determinants of household income diversification

Ordinary linear regression (OLS) analysis was used to estimate determinants of household income diversity index for the study areas. In the analysis, total household income will be transformed using natural logarithms to control for variance and to ensure normality (Jacob, 2017). The formula is indicated as;

$$Y = a + b_1X_1 + b_2X_2 + b_3X_3 + b_4X_4 + - - - -b_{12}X_{12} + \mu \qquad - \qquad \text{(Eqn. 2);}$$

Where Y= household income diversity index; a = constant, b_i = 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 basic socio-economic characteristics of the study population (N = 1009). Households headed by a male were significantly (t = 3.23, p<0.05, df =2) different from households headed by a female (= 311.33±158.94, N = 934, vs. = 14.67±25.40, N = 75). This is an indication that the majority (92.57%) of households had an elderly man to dictate the affairs in each family. This is in accordance with Olorunsanya and Omotesho (2011) and Olawuyi and Adetunji (2013) observation that the majority of rural households in Nigeria are headed by a 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 (Silver *et al*., 2015)

Table 3 also indicates that there existed significant (F = 3.53, p<0.10) variation among the age groups. The majority (44.90%, M = 151.00±79.30, N = 453) of sampled respondents were within the age group of 21-40 years, followed by those in the age group of 41-60 years (27.45%, M = 92.33±28.02, N = 277) and those older than 60 years (15.56%, M = 52.33±25, N = 157), while those belonging to less than 20 years of age were the fewest (12.09%, M = 40.67±26.54, N = 122). The result implies that the majority of respondents are in their prime, hence, they are at their economically active and productive age (Jacob *et al*., 2013; Jacob *et al*., 2015; Silver *et al*., 2015; Nelson *et al*., 2017; Nelson *et al*., 2018).

The level of education did not vary significantly (F = 1.54, p>0.05) among the households. However, the majority of 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 fewest held 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 length of schooling years falls under post-primary level of education, which is higher than 4.89 years reported for most of rural households in Uganda (Uganda Bureau of Statistics 2002; Balikoowa, 2008). The high literary rate in the study area agrees with Olawuyi and Adetunji (2013), Jacob *et al*. (2013), Silver *et al*. (2015) and Oluwatusin and Sekumade (2016) that the majority of households in the rural areas in the country have had formal education, which according to Jacob *et al*. (2013) 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 (Emelue *et al*. 2014).

Occupationally, there existed a 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 represented occupation practiced by the sampled respondents. The high rate of farming household in the study area is in accordance with the observations of Chianu *et al*. (2004), Tumusiime (2006), Balikoowa (2008) and Olayide *et al*. (2009) that agriculture is the dominant livelihood activity of rural communities.

The ownership of land by households significantly (t = 2.69, p<0.10, df =2) differs from that of households who did not own land (= 321.00±171.13, N = 963, vs. = 15.33±26.59, N = 46). This implies that the majority (95.44%) of households in the study area had possession of land. This agrees with the observation of Balikoowa (2008) that land possession is usually location specific, hence the 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. The majority of 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 more (2.99%, M = 9.67±3.06, N = 28) were the fewest. 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 (Balikoowa, 2008). 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 from other households. However, the majority of households in the study area were of the family size of fewer 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 households with more than 15 members were the least common (12.48%, M = 42.00±30.51, N = 126). The result agrees with the observation of Olorunsanya and Omotesho (2011), Javed and Asif (2011) and Oluwatusin and Sekumade (2016) who reported that rural areas are characterized by large family sizes ranging between 1-20 members per household. This could probably be a result of the polygamous nature of most male-headed households in the study area (Olorunsanya and Omotesho, 2011).

Also, among the households, 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 earning between ₦801,000.00 and ₦1,000,000.00 were the fewest (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 were 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 (NBS, 2011) and 0.441. The result (0.358) is also lower than the level of income inequality reported for rural communities in Nigeria (NBS, 2011; Jacob et al., 2016). The significant reduction in inequality among rural households in the study area could be attributed to location and climate which could have a

stronger 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 a rural area is laudable because inequality is an agent that can harm social cohesion and may exacerbate conflict (Adegoke, 2013).

Table 3: Demographic characteristics of sampled respondents

Variables		Total			
		F	**%**	**Mean±SD**	**Significant level**
Gender	Male-headed	934	92.57	311.33±158.94a	3.23**
	Female-headed	75	7.43	14.67±25.40b	
	Total	1009	100		
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		
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		
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		
Land ownership	Yes	963	95.44	321.00±171.13a	2.69*
	No	46	4.56	15.33±26.59	
	Total	1009	100		
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		
Household	≤ 5	370	36.67	123.33±42.00	2.95ns

size	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		
Annual	≤ 200	154	15.26	51.33±30.66	0.94ns
income of	201- 400	166	16.45	55.33±34.00	
household	401- 600	248	24.58	82.67±24.84	
head	601- 800	180	17.84	60.00±10.54	
(₦0,000)	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
Source: Field Survey (2017)

3.2 Degree of income diversification indices of households among the parks

The result in Table 4 shows the level of income diversification among the households in the parks. Households in Kamuku National Park had the lowest (0.278) degree of income diversification. This was followed by Old Oyo with 0.391, while households in Okomu had the highest (0.456) level of income diversification. The relatively low degrees of diversification recorded by households in support zone communities of these parks could be attributed to the impact of the governance structure in the parks, which makes the households less dependent on off-farm income (Jacob, 2017). Also, the variation in income diversity indices among the households in the parks could be attributed to their level of dependent on off-farm income sources. According to Jacob (2017), off-farm income was significantly different (p<0.1) among the National Parks, as households from Okomu National Park received the highest mean annual off-farm income (₦330214.100). The high diversification index for households in Okomu National Park is to be attributed to the presence of Okomu Oil Limited and Michelin Rubber Plantation in the same vicinity with the National Park, thus providing employment for its surrounding communities (Adelekan et al., 2015). These livelihood activities provided off-farm income to these households, thereby improving their income generation. Also, the majority of households in Okomu support zone communities were living in camps and were non-natives in the area. They are reported to have migrated to the area in search for work in the oil and rubber plantations hence most of the households possessed low land acreage for farming and livestock rearing (Terbough et al., 2002).

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Table 4: Degree of Income diversification among the parks

Park	Mean Simpson Index of Diversity
Kamuku	0.278
Old Oyo	0.391
Okomu	0.456
Total	0.375

Source: Field Survey (2017)

3.3 Determinants of household income diversification

The result presented in Table 5 shows the factors that prompt a household to diversify its income source. Coefficient of multiple determination (R^2) for the regression is 0.714, implying that the variables used accounted for 71.4% of the variations in income diversification among the households in the studied area. The F-Statistic of 17.550 is significant at $p < 0.01$, thus indicating that the variables included in the model have an influence on causing the households the study area to diversify their income sources. The following household variables, namely: off-farm dependence (0.001211, p>0.01), level of household head education (0.007636, p<0.01) and gender of household head (0.100674, p<0.01) were all positive and significant, while income of household (0.0000000417, p<0.01), age of household head (-0.00177, p<0.01), household size (-0.0119, p<0.01) and occupation of household head (-0.01075, p<0.01) were all negatively significant.

Households income diversification in rural areas is dependent on the various assets owned by a household (Balioowa, 2008). The negative and significant contribution of total household income to diversity index of income implies that the greater the income of a household, the lesser the need for income diversification among the households. This observation is supported by the observation of Jacob *et al*. (2016) that the factors that encourage a household to become more diversified have the higher likelihood of aggravating their living conditions, while the factors that discourage diversification enhance a household specialization, thus having a higher likelihood of improving the living conditions or income of the household. The above observation, however, differs from the opinion of Balikoowa (2008) who envisaged that total income diversity increases with total income because wealthier families with higher incomes possess the resources to engage

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in more than one income activity. One of such sources, according to him, is land which is necessary for livestock husbandry. Also, wealthier families can afford to hire labor for agricultural activities while family members engage in other off-farm activities (Balikoowa, 2008).

The implication of the negative relationship of age of the household head (-0.00177, p<0.01) with income diversification index in the study is that the younger the household head is, the more energetic he is to easily take risk and diversify his livelihood strategies and *vice versa,* thus confirming the findings of Anyanwu (2013), Ermias *et al*. (2014), Udeagha (2015) and Jacob *et al*. (2016)*.* Also, a decrease in the productive years of the household head was observed to significantly increase the probability of the household being poor because elderly persons decline in their strength and productivity as they get older as well as having increased health problems (Igbalajobi *et al*., 2013; Anyanwu, 2013).

Off-farm dependence had a positive and significant impact on income diversification of households. This implies that households which are more dependent on off-farm income have a higher opportunity of diversifying their income. Also, the household head's level of education significantly influenced household income diversification. This could be attributed to the potentials of education in enhancing a person's acquisition and utilization of information to diversify his/her income sources. This implies that households with higher education are more likely to seek non-farm employment in rural areas. This is in accordance with Lass *et al*. (1991), Babatunde and Qaim (2009), Anyanwu (2013), Ermias *et al*. (2014), Udeagha (2015), Jacob *et al*. (2016) and Ukpong *et al*. (2018) who reported that a higher level of education may lead to better livelihood activities, because educated households are more likely to access information easily and use it to make well informed decisions to enhance their livelihood status.

Household size is significant and negatively related to income diversification meaning that, all things being equal, each extra member decreases the income diversification of a household, thereby increasing the poverty level of the household. This is most applicable when the majority of household members are dependents and as such do not contribute to the household income. This finding is consistent with that of Asmah (2011).

Gender of the household head contributed positively and significantly to the household income diversification. This indicates that male-headed households are more likely to diversify their household income so as to increase it. However, female household heads negatively affect

household income. This may be explained by the fact that most female household heads were usually poor, widowed or old and are less productive than their male counterparts. This result is consistent with the observation of Jacob *et al.* (2016) and (2018), who reported that gender is a determining factor of household poverty and income level.

Occupation of household head was positive and significantly (0.01075, $p<0.01$) contributed to the diversification of household income. This implies that the type of work the household head does will determine the amount of household income and the need for diversification to earn more income. Household heads who earned more income from a single income source were less likely to diversify their income source compared to poor household who needed to diversify their income sources in other to earn more income. This observation agrees with Sundaram's (2001) observation that workers with higher incomes or regular wage/salaried workers whose incomes are higher than those received by common laborers (agricultural and non-agricultural) are less willing to diversify their income sources.

Table 5: Linear regression of determinants of household income diversification

Variables	Coefficients	Standard Error	P-value
Intercept	0.387686	0.044631	0.00***
Income	-4.17E-08	5.01E-09	0.00***
Age	-0.00177	0.000479	0.00***
Farm dependence	0.000629	0.000394	0.11
Off-farm dependence	0.001211	0.000387	0.00***
Land	0.00036	0.002406	0.88
HH Education	0.007636	0.00116	0.00***
Household size	-0.0119	0.002047	0.00***
Gender	0.100674	0.026683	0.00***
Occupation	0.01075	0.001935	0.00***
Adult Equivalent	0.00064	0.000666	0.33
Cattle equivalent	0.000174	0.003016	0.95
Size of farm	-0.00063	0.000808	0.43

$R^2= 0.714$; R^2 Adjusted $= 0.614$; F = 17.550***
*** = significant at $p<0.01$, ** = significant at $p<0.05$, * = significant at $p<0.1$
Source: Field Survey (2017)

4. Conclusion and Recommendation

The study showed that the majority of household heads were literate and at their prime of age. This therefore calls for government and other stakeholders in conservation to build the capacity of the people through training them on modern practices and technology so that they can take advantage of them to be gainfully engaged.

Also, considering the low level of income diversification in the study area as a result of factors such as total household income, age of the house head, level of dependence on off-farm income, educational level of the household head, household size, occupation of the household head and the number of adult present, modalities should be put in place, including infrastructures to ensure that the people are able to diversify their income sources as these will help in curbing restiveness in the area.

It is recommended that the farming profession which is the main occupation of the people should be made more attractive through the introduction of loan and other agricultural incentives so as to enhance their farm productivity.

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DETERMINANTS OF INCOME DIVERSIFICATION AMONG SUPPORT ZONE COMMUNITIES OF NIGERIA NATIONAL PARKS

Determinanty dywersyfikacji dochodów wśród społeczności stref wsparcia parków narodowych Nigerii

Streszczenie

W artykule zbadano uwarunkowania zróżnicowania dochodów gospodarstw domowych w strefach wsparcia społeczności parków narodowych w Nigerii. Dotyczyło to wykorzystania danych gospodarstw domowych zebranych za pomocą ankiet, które zostały losowo rozesłane do 1009 gospodarstw domowych na badanym obszarze. Uzyskane dane przeanalizowano za pomocą analizy statystycznej prawdopodobieństwa i nie-prawdopodobieństwa, takiej jak regresja i analiza wariancji, aby przetestować średnią różnicę między parkami. Uzyskany wynik wskazuje, że większość głów gospodarstw domowych stanowili mężczyźni (92,57%) w przedziale wiekowym 21 - 40 lat (44,90%), posiadali wykształcenie pozaformalne (38,16%), byli rolnikami (65,21%), posiadali grunty (95,44%), z wielkością gospodarstwa domowego 1-5 (36,67%) i rocznym dochodem w przedziale ₦401,000 - ₦600,000 (24,58%). Średni wskaźnik różnorodności Simpsona wykazał ogólnie niski (0,375) poziom zróżnicowania dochodów wśród gospodarstw domowych. Dochód, wiek, zależność pozarolnicza, wykształcenie, wielkość gospodarstwa domowego i zawód, w przypadku których istotne (p <0,01) czynniki wpływały na zróżnicowanie dochodów gospodarstw domowych. W badaniu zaleca się poprawę istniejącej infrastruktury i kapitału społecznego w społecznościach jako drogi do poprawy warunków życia i zapewnienia pozytywnych zachowań na badanym obszarze.

Słowa kluczowe: Dywersyfikacja dochodów, obszar chroniony, środki do życia, ubóstwo, Nigeria.