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Demographic Factors as Predictors of Environmental Attitudes and Ecological Behaviour of Host Communities of Okomu National Park and Yankari Game Reserve, Nigeria

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Authors' contributions

This work was carried out in collaboration between all authors. Author PNAV conceived the presented idea, carried out the survey, analysed the data and wrote the manuscript. Authors SAO and AOJ supervised the research while author OALA verified analytical methods. All authors gave critical feedback and helped shaped the study and manuscript.

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ABSTRACT

This study was conducted to examine the effects of six (6) demographic factors on environmental attitude and ecological behaviour of the host communities of two (2) protected areas (PAs). This study examines age, gender, marital status, level of education, income and religion to evaluate which factors best predict as well as the sub-factors that influence pro-environmental attitude and behaviour. Data collection was through questionnaire administration to the six (6) communities at Okomu National Park and five (5) communities at Yankari Game Reserve. A total of 399 residents were surveyed. Data were analysed using descriptive statistics such as frequency counts,

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percentages, means and standard deviation. Yankari residents had 51.4% pro-environmental attitude while Okomu resident (39.1%) were anti-environmental. There was more pro-ecological behaviour from Yankari (64.1%) residents than Okomu (60.6%) residents. Inferential statistics involving categorical regression showed that demographic variables significantly predicts pro-environmental attitude accounting for 14% of the variance in environmental attitude and only 4% of the variance in behaviour. Furthermore, five (5) variables (age, gender, marital status, level of education and religion) were predictors of environmental attitudes while three (3) independent variables significantly predicted the ecological behaviour of the residents. It is recommended that understanding the variables that influence the local residents' environmental attitude and behaviour and integrating into environmental education, development initiatives and conservation policies is very important in achieving a successful management plan and functioning of protected areas.

Keywords: Demographic; environmental attitude; behavior; communities; Yankari; Okomu; Nigeria.

1. INTRODUCTION

Consideration for the communities around protected areas (PAs) is necessary for the management of the resources to make the right choices and approach to management. The uniqueness of communities is generally tied to demographic factors predominant in them. Factors such as age, income, race, urban/ rural residence, and regional residence are often considered when analyzing environmental attitude and behaviour [1,2,3]. Age, income, race, community residence (urban or rural) and religion of residents have all been examined in an attempt to explain incentives and opinions regarding their natural surroundings. Gender is also associated with attitude and behaviour towards the environment. Women are often thought to possess more concern and sometimes better awareness about environmental issues. However, men are generally recognised for greater contributions to activism [4,5]. Marital and parental statuses are additional important variables associated with environmental attitudes and behaviours. Married couples and parents seem to have more pro-environmental knowledge, attitudes, and behaviours [6].

Researchers customarily follow hypothetical development with a more direct analysis of demographic variables in effect to clarify specific correlates of attitude and behaviour. Subtle changes in these factors often influence human attitude and behaviour which ultimately affect environmental attitude and behaviour. Some of these demographic variables are also known to predict grounds on which environmental attitudes and ecological behaviour are formed. Demographic and socio-economic factors have been identified [7] to exert important influences on the attitude an individual holds. For example, educational attainment remains a prominent point of interest when predicting differences in outcomes of environmental attitude and behaviour [1,2,8]. Religion though less frequently analysed but still worthy of note, has also been associated with environmental attitude and ecological behaviour. It has being found [2] that liberal religions are more supportive of pro-environmental plans or activities than their counterparts. Greeley [9] noted that stringent belief in the Bible correlates with less pro-environmental attitudes. Several socio-demographic factors have been reported to correlate with pro-ecological behaviours [10]. Furthermore, demographics are usually considered when analyzing both environmental attitude and behaviour [1,3].

The dearth of research on the prediction of environmental attitude and ecological behaviour using demographic factors particularly in Nigeria and specifically in the study areas has informed this paper. The study focuses on investigating the influence of six [6] demographic variables (Age, gender, marital status, level of education and religion) on environmental attitude and ecological behaviour of the study areas. The study, therefore, examines demographic variables that significantly contribute to environmental attitude and ecological behaviour of the residents and also the significant differences that exist within categories of demographic factors in predicting pro-environmental attitude and positive ecological behaviour of the residents at the study sites.

2. METHODOLOGY

2.1 The Study Areas

The research was conducted in two PAs which are a National Park and a Game reserve, in Nigeria. Okomu National Park (OKNP) located in Edo state which is a forest ecological zone and covers an area of 116 km^2 [11]. The Yankari

Game Reserve is an equivalent game reserve and by implication has all that is required to give it a National park status and has the same level of protection though managed by the state. The game reserve has been recognised as the most popular yet controversial eco-destination as well as the only National park that was reverted to a game reserve in 2006 by the then National Assembly [12]. It is in Bauchi State; within the savanna ecological zone of Nigeria occupying 2244 km^2 area of the state [13].

2.1.1 The population of the study

This consists of members of the rural communities within 15 km around the two protected areas.

2.1.2 Sampling frame

This consists of 20,061 rural dwellers projected from the obtained census data of the National Population Commission (NPC) as at 2006 for both Okomu and Yankari communities. The estimation was computed at 3.18% population growth rate as stipulated by the Federal Republic of Nigeria Official Gazette – FRNOG [14].

2.2 Sampling

The support zone communities were selected using a stratified random sampling of village-based on established ranges/patrol posts. The villages were selected from the park and game reserve at 30% sampling intensity for the study based on the theory for sampling techniques[15] The total representative sample size of host communities were 399 using Krejcie and Morgan [16] sampling size determination model at 95% confidence level and 0.05 margin error or degree of accuracy.

In Okomu National Park six (6) communities (Fig. 1) comprising of Hassan Camp, Igwuowan, Udo-akan, Amaoba, Nikrogha and Mile 3 were assessed.

The survey in Yankari game reserve involved five (5) communities (Fig. 2) made up of Kwale, Mairari, Rimi, Bogwas and Duguri communities.

2.3 The Instrument for Data Collection

The questionnaire contained two parts: The first Section (A) was made up of socio-demographic data (age, gender, marital status, education, income, religion) and the second section (B) elicited the villagers' environmental attitude and ecological behaviour toward protected areas and environment. The questionnaire elicited socio-demographic data of age, gender, marital status, level of education, income and religion as well environmental attitude and ecological behaviour domains.

2.4 Measurement and Analysis

Five socio-demographic questions regarding: Gender (Male = 0, Female = 1), Age range (20-30 = 0, 31-40 = 1, 41-50 = 2, 51-60 = 3, 61 and above = 4) in years, Marital Status (Single = 0, Married = 1, Divorced = 2, Widowed = 3), Income was scaled in naira (10000-19000 = 0, 20000-29000 = 1, 30000-39000 = 2, 40000 and above = 4), Level of Education (Non-formal education = 0, Adult literacy = 1, Primary sch. Certificate = 2, Secondary Certificate = 3, NCE/Diploma = 4, HND/Degree = 5, MSc/PhD = 6), Religion (Christianity = 0, Islam = 1, Traditional religion = 2).

The New Ecological Paradigm (NEP) scale [17] was used to measure environmental attitudes. The NEP addresses five aspects of an environmental worldview with three statements for each: the realisation of limits to growth, anti-anthropocentrism, belief in the fragility of the balance of nature, rejection of human exceptionalism, and belief in future eco-crisis. The NEP scale is a 15 items Likert-type scale and was ordered on a four-point rating from strongly disagree (SD = 1), disagree (D = 2), agree (A = 3) and strongly agree (SA = 4). Among these fifteen statements, there are eight positively (pro-environmentally) related statements and seven negatively related statements. Agreement with eight positively related statements results in higher measures, while measures of the seven negatively related statements are reversed so that disagreement with them results in higher measures. All 15 statements were aggregated for analyses.

Ecological behaviour was measured using a ten item scale which was an adapted form of the General Ecological Behaviour (GEB) scale by Kaiser *et al.,* [18] and ordered on a four-point rating scale as Strongly Agree (SA = 4), Agree (A = 3), Disagree (D = 2) and Strongly Disagree (SD = 1).

The statistical treatment of the data was performed using the software Statistical Package for Social Sciences (SPSS) version 20.0. Frequency counts, weighted means, standard deviation and categorical regression were used for data analysis.

Table 1. Sampling frame for Okomu National park and Yankari Game Reserve

Study area (Range)	Selected communities	Population	Projection (2015)	Sample size	GPS points	
Okomu National Park*						
Arakhuan	Hassan Camp	712	943	25	06.21018°N	005.20275°E
Igwuowan	Igwuowan	249	330	11	06.26049°N	005.22331°E
	Udo-akan	214	283	7	06.26373°N	005.20085°E
Julius Creek	Amaoba	915	1,358	38	06.23492°N	005.17015°E
Babui	Nikrogha	1,212	1,606	82	06.15070°N	005.21245°E
	Mile3	1,025	1,359	32	06.16220°N	005.20001°E
Total	6	4,327	5,879	195		
Yankari Game Reserve*						
Yashi Range	Kwale	1200	1,591	24	10.02022°N	010.36506°E
	Mairari	1200	1,591	24	10.00599°N	010.41184°E
Karyo Range	Rimi	1500	1,988	30	09.33342°N	010.30439°E
	Bogwas	800	1,060	16	09.33522°N	010.29049°E
Tonglong Range	Duguri	6000	7,952	110	09.41485°N	010.16332°E
Total	5	10,700	14,182	204		
Total population size for both PAs			20,061	399		

*Source: Field work 2016, * National Population Commission (2006),*

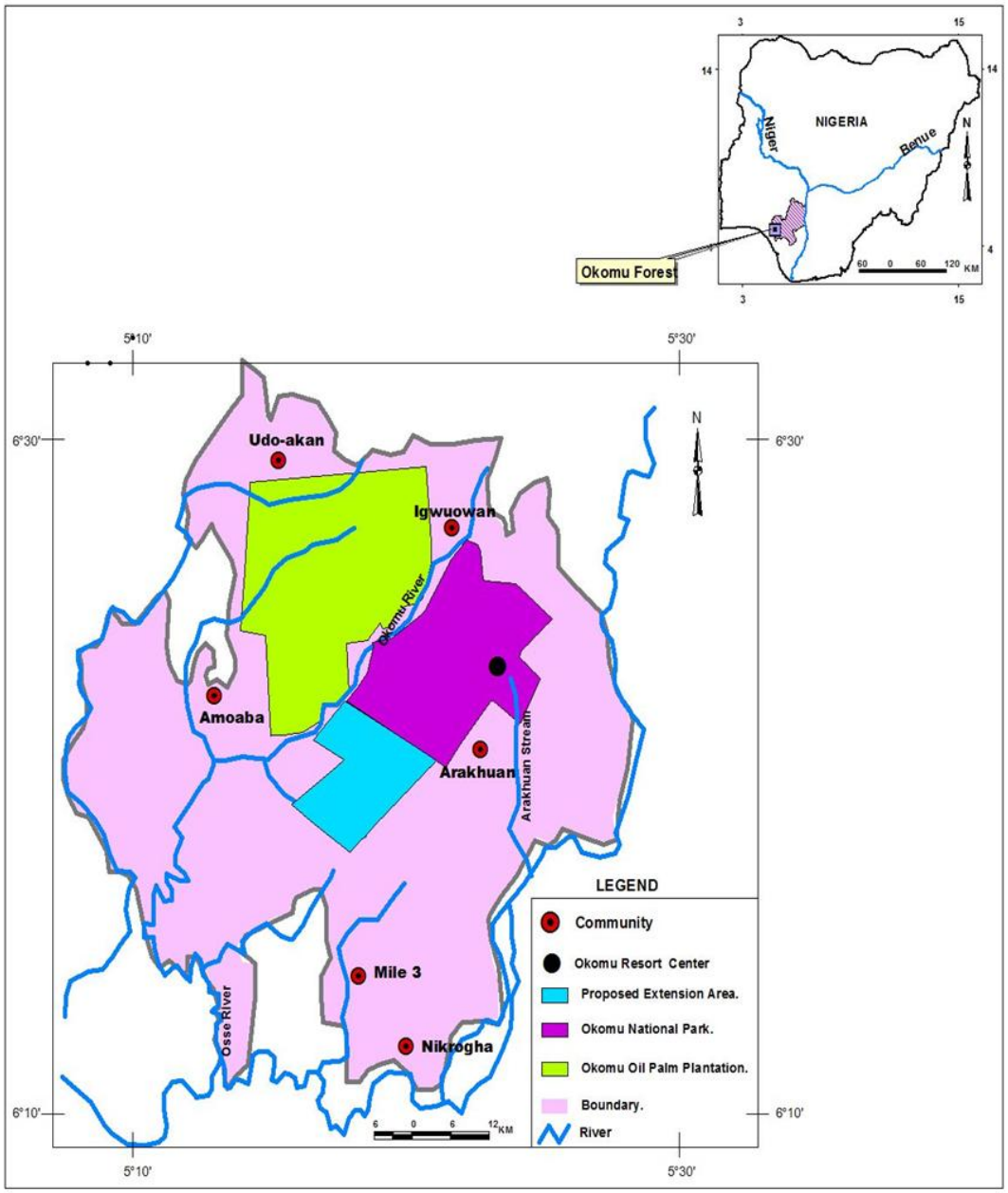

Fig. 1. Map of Yankari game reserve showing surveyed communities
Source: Field work 2016

2.5 Validity and Reliability of Instruments

The content and face validity were used to determine the adequacy of the content of the measuring instrument. The instrument was developed on the basis of the study objectives. Supervisors, experts in the field of education and human relations scrutinised the instrument to improve its content and face validity. Thereafter the necessary modifications were made; ambiguous items were amended while those considered irrelevant were removed.

The reliability estimate of the instruments represented in Table 2 was established through the split-half reliability method and its associated

Spearman-Brown Prophecy Formula. This was done by administering questionnaires on certain number of respondents who were never part of the main study. But at the time of scoring, two sets of scores are derived (odd and even). Items with odd numbers formed one half test and items with even numbers formed second half test. This was then calculated using Crombach-alpha value and the results derived were corrected with the Spearman-Brown Prophecy Formula which also tested for the internal consistency. A reliability co-efficient of above 0.79 and above asserted the instruments reliable.

Table 2. Reliability estimates of research instruments

Variables	Alpha coefficient	Number of Items
Environmental attitudes	0.80	15
Ecological behaviour	0.81	10

Source: Field work 2016

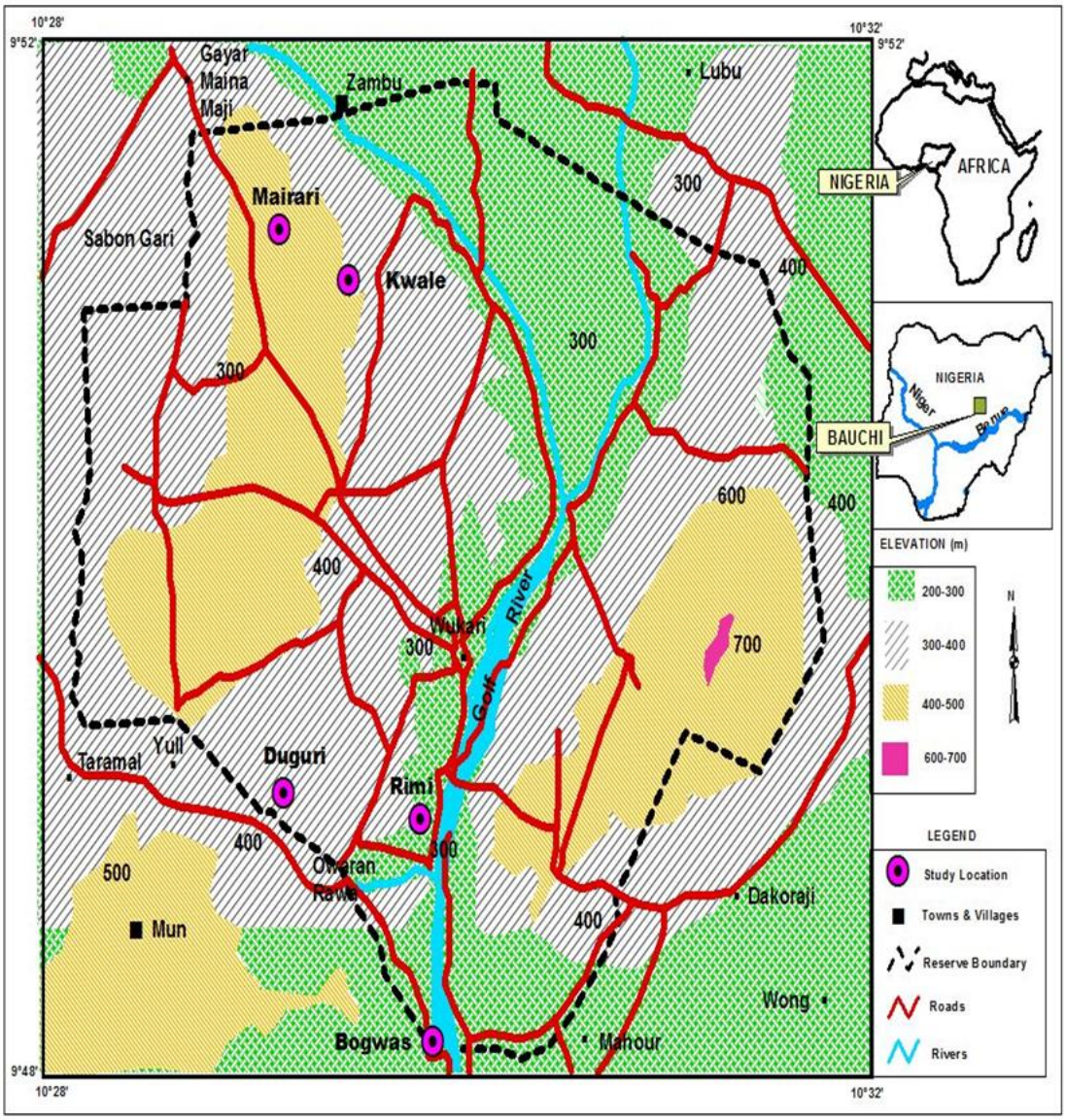

Fig. 2. Map of Yankari game reserve showing surveyed communities

Source: Field work 2016

3. RESULTS

In Table 3, most respondents in both study areas (64.7%) were within the age range of 31-50 years, with 81.5% males and 80.7% married. The dominant level of education in both study areas was either non-formal education (26.1%) or secondary school certificate (28.6%) with an average percentage (51.9%) earning less than ₦40,000 (Forty thousand naira) while religious groups were dominant relative to study site. OKNP had 79.5% Christian residents while Yankari Game Reserve accounted for 91.7% Islam religion.

The environmental attitudes of residents' of Okomu and Yankari PAs are discussed and compared in Tables 4 and 5 respectively using the New Ecological Paradigm (NEP) scale with 15 item statements. The result of this scale will be discussed based on a dichotomous classification of the items that make up the scale, 8 items consist of pro-environmental (1, 2, 3, 4, 6, 9, 10, 11) attitudes and 7 items (5, 7, 8, 12, 13, 14, 15) make up the anti-environmental orientation. Both communities had negative environmental attitude toward conservation based on item 1 which states that "The earth is approaching the highest number of people it can carry" where a high percentage of them were anti-environmental, but it was more pronounced in Okomu (78%) (Table 4) than at Yankari (59%) (Table 5). An almost similar trend was observed for item 2 (The earth is like a house with very small room and small resources) where more than three quarter of the population of the communities in Okomu (76.4%) (Table 4) had more negative environmental attitude about conservation compared Yankari (52%) (Table 5). Also close to three quarters of Okomu (71.8%) shared negative premonitions on the ecological issue "If things continue on their present course, we will soon experience a major environmental problem" which was still quite higher than that of Yankari (54.4%) residents. Furthermore, result of the Item 4 of the NEP scale result which talks about humans' interference with nature revealed that a higher percentage of Okomu (65.7%)

Table 3. Demographic profile of community respondents (n=399)

Variable	Item	Okomu		Yankari		Both	
		F	%	F	%	F	%
Age (Year)	20 – 30	28	14.4	39	19.1	67	16.8
	31 – 40	69	35.4	47	23.0	116	29.1
	41 – 50	69	35.4	73	35.8	142	35.6
	51 – 60	25	12.8	38	18.6	63	15.8
	61 and above	4	2.1	7	3.4	11	2.8
Gender	Male	137	70.3	188	92.2	325	81.5
	Female	58	29.7	16	7.8	74	18.5
Marital status	Single	32	16.4	33	16.2	65	16.3
	Married	158	81.0	164	80.4	322	80.7
	Divorced	2	1.0	5	2.5	7	1.8
	Widowed	3	1.5	2	1.0	5	1.3
Level of	Non-formal	38	19.5	66	32.4	104	26.1
Education	Adult Literacy	19	9.7	32	15.7	51	12.8
	Primary	36	18.5	22	10.8	58	14.5
	Secondary	49	25.1	65	31.9	114	28.6
	NCE/OND	35	17.9	13	6.4	48	12.0
	HND/Degree	18	9.2	6	2.9	24	6.0
Monthly	10000-19000	16	8.2	10	4.9	26	6.5
income (₦)	20000-29000	39	20.0	30	14.7	69	17.3
	30000-39000	48	24.6	64	31.4	112	28.1
	40000- above	92	47.2	100	49.0	192	48.1
Religion	Christianity	155	79.5	17	8.3	172	43.1
	Islam	39	20.0	187	91.7	226	56.6
	African Traditional Religion	1	0.5	0	0.0	1	0.3

Source: Field work 2016

had more negative understanding about the environment compared to Yankari (43.2%). The result also reveals an equal average percentage for the two PAs, Okomu (56.6%) and Yankari (50%) had negative perceptions about Item 6 which says humans are seriously abusing the environment. Thus an average number believes the environment is not being abused. Regarding Item 9 both study areas revealed very positive attributes to existence of plants and animals, here also Yankari (97.5%) had a higher positive environmental attitude compared to Okomu (88.2%). A similar result was obtained for item 10 where Yankari (89.6%) still had a little more positive environmental attitude about man being subject to the laws of nature than Okomu (88.7%). Item 11 exhibited contrary views from both PAs where a higher percentage of Okomu (61%) had negative views about the balance of nature being very weak and easily changed compared to 65.7% of Yankari residents who were pro-environmental on this item.

From the Table 5 and 7 again the results on anti-environmental attitude revealed that a higher percentage of Yankari (72.6%) residents had negative environmental attitudes about item 5 than the average percentage of Okomu (53.8%) that had same attitude that human intelligence will make sure that we make the earth habitable. Most residents of both PAs were negative about item 7 the idea of unlimited resources and learning to use them, Yankari (98%) were more negative compared to an almost similar sample at Okomu (93.9%). Another greater number of Yankari (96.6%) also had a negative though almost same percentage with Okomu (85.1%) in understanding item 8 by accepting the idea that nature exist primarily for humans use and has no inherent use of its own. Regarding how fragile the balance of nature could be (Item 12). Most Okomu (67.7%) residents and an average number of Yankari (50.5%) had a negative notion that the balance of nature was not delicate. Item 13 which talks about environmental awareness had 61.5% of Okomu dwellers who felt there was too much talk about environment as opposed to the Yankari communities where 70.1% of residents were of contrary view. The anthropocentric view put forward by item 14 (Humans have the right to modify the natural environment to suit their needs) had an almost three quarter positive response from Okomu (73.9%) which was comparative to Yankari (68.7%) revealing an anti-environmental disposition. On Item 15 which states that humans will eventually learn enough about how nature works to be able to control it both PAs revealed an almost equal response where half population of both sites had negative views. Yankari (45.6%) had an almost average number that had negative feeling similar to Okomu (44.6%). The result of the NEP scale show that on the whole the publics of both protected area had negative perceptions on 10 items out of the 15 items. Table 5 also shows a summation result for the environmental attitude scale which portrays an average positive environmental attitude from communities of Yankari (51.9%) while Okomu (39.1%) residents were anti-environmental.

The result on the ecological behaviour of respondents in Table 6 and 7 at both PAs revealed that a high proportion of Yankari (97.1%) had negative behaviours on the use of chemicals in the soil which was an almost similar response from Okomu (91.8%). The Item 2 of the scale which is on the disposal of nylon show a disparity as a higher positive response was observed from Okomu compared to Yankari (49.5%). Similarly, Okomu (67.2%) had a comparatively higher positive response on item 3 which entails keeping the environment clean than Yankari (60.3%). However, item 4 (staying within established limits) revealed a contrary result with Yankari (91.7%) behaving better than Okomu (61%). Contrary to what one would have expected the item 5 which is also on limitations, contradicts the results from item 4 which should have followed suit where Okomu (89.2%) had a very positive response compared to the high negative result from Yankari (92.7%). The two PAs however showed an almost equal result on item 6 where both had very negative result that they were not members of environmental NGO, at Okomu (93.3%) and Yankari (93.6%). The two protected areas had positive behaviour with respect to item 7 which elicited their interest in environmental issues, even though the number at Yankari (91.2%) outweighed that of Okomu (78%). An almost comparable result was obtained for item 8 regarding their contribution to the conservation of the PAs, with Yankari (93.2%) showing a higher positive outcome than Okomu (78.5%) and again same conclusions was found in item 9 (concern for the resource) where Yankari (92.7%) was higher than Okomu (81%). Okomu (75.9%) however, showed a slightly better result on item 10 which enquired on their previous active role in conservation, than Yankari (72.6%). The cumulative result in Table 7 revealed a pro-ecological behaviour from Yankari (64.1%) more than Okomu (60.6%) with a little disparity.

Table 4. Environmental attitudes of the rural public of Okomu National Park (n=195)

SN	Item	SA		A		D		SD		Weighted	
		F	%	F	%	F	%	F	%	Mean	Std
1	The earth is approaching the highest number of people it can carry	10	5.1	31	15.9	76	39.0	78	40.0	1.9	1.0
2	The earth is like a house with very small room and small resources	10	5.1	36	18.5	73	37.4	76	39.0	1.9	1.0
3	If things continue on their present course, we will soon experience a major environmental problem	19	9.7	36	18.5	89	45.6	51	26.2	2.1	1.0
4	When humans interfere with nature it often produces dangerous results	20	10.3	47	24.1	75	38.5	53	27.2	2.2	1.1
5	Human intelligence will make sure that we make the earth habitable	35	17.9	70	35.9	59	30.3	31	15.9	2.4	1.1
6	Humans are seriously abusing the environment	34	17.4	49	25.1	79	40.5	33	16.9	2.4	1.1
7	The earth has plenty of natural resources if we learn how to develop them	120	61.5	63	32.3	9	4.6	3	1.5	1.5	0.8
8	Humans were meant to rule over the rest of nature	77	39.5	89	45.6	22	11.3	7	3.6	1.9	0.9
9	Plants and animals have as much right as humans to exist	69	35.4	103	52.8	14	7.2	9	4.6	3.2	0.9
10	Despite our special abilities humans are still subject to the laws of Nature	82	42.1	91	46.7	16	8.2	6	3.1	3.3	0.9
11	The balance of nature is very weak and easily changed	23	11.8	53	27.2	92	47.2	27	13.8	2.4	1.0
12	The balance of nature is strong enough to cope with the impacts of modern pollution	42	21.5	90	46.2	50	25.6	13	6.7	2.2	1.0
13	The so–called “ecological crisis” facing humankind has been greatly over talked about	41	21.0	79	40.5	54	27.7	21	10.8	2.3	1.1
14	Humans have the right to modify the natural environment to suit their needs	46	23.6	98	50.3	32	16.4	19	9.7	2.1	1.0
15	Humans will eventually learn enough about how nature works to be able to control it	36	18.5	51	26.2	67	34.4	41	21.0	2.6	1.2

Source: Field work 2016, Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD), Standard deviation (std).

Table 5. Environmental attitudes of the rural public of Yankari game reserve (Okomu=195, Yankari=204)

SN	Item	SA		A		D		SD		Weighted	
		F	%	F	%	F	%	F	%	Mean	Std
1	The earth is approaching the highest number of people it can carry	30	14.7	60	29.4	55	27.0	59	28.9	2.3	1.2
2	The earth is like a house with very small room and small resources	30	14.7	53	26.0	69	33.8	52	25.5	2.3	1.2
3	If things continue on their present course, we will soon experience a major environmental problem	32	15.7	61	29.9	71	34.8	40	19.6	2.4	1.1
4	When humans interfere with nature it often produces dangerous results	48	23.5	68	33.3	55	27.0	33	16.2	2.6	1.2
5	Human intelligence will make sure that we make the earth habitable	38	18.6	110	53.9	17	8.3	39	19.1	2.3	1.1
6	Humans are seriously abusing the environment	41	20.1	61	29.9	79	38.7	23	11.3	2.6	1.1
7	The earth has plenty of natural resources if we learn how to develop them	64	31.4	136	66.7	2	1.0	2	1.0	1.7	0.6
8	Humans were meant to rule over the rest of nature	80	39.2	117	57.4	4	2.0	3	1.5	1.7	0.7
9	Plants and animals have as much right as humans to exist	68	33.3	131	64.2	4	2.0	1	0.5	3.3	0.6
10	Despite our special abilities humans are still subject to the laws of Nature	69	33.8	113	55.4	14	6.9	8	3.9	3.2	0.8
11	The balance of nature is very weak and easily changed	34	16.7	100	49.0	26	12.7	44	21.6	2.6	1.2
12	The balance of nature is strong enough to cope with the impacts of modern pollution	41	20.1	62	30.4	69	33.8	32	15.7	2.5	1.1
13	The so–called “ecological crisis” facing humankind has been greatly over talked about	24	11.8	37	18.1	90	44.1	53	26.0	2.8	1.1
14	Humans have the right to modify the natural environment to suit their needs	71	34.8	69	33.8	48	23.5	16	7.8	2.0	1.1
15	Humans will eventually learn enough about how nature works to be able to control it	19	9.3	74	36.3	28	13.7	83	40.7	2.9	1.2

Summative outcome of environmental attitude	Okomu		Yankari		Both	
	F	%	F	%	F	%
Anti-environmental attitude	119	60.9	99	48.6	218	54.6

Source: Field work 2016, Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD)

Table 6. Ecological behaviour of the rural publics of Okomu Park (n=195)

	Scale items	SA		A		D		SD		Weighted	
		F	%	F	%	F	%	F	%	Mean	Std
1	I use herbicides to control grasses	110	56.4	69	35.4	5	2.6	11	5.6	3.4	0.9
2	I dispose polythene (Nylon) bags properly after use;	65	33.3	84	43.1	28	14.4	18	9.2	3.0	1.0
3	After a party I make sure the place is clean before leaving;	64	32.8	67	34.4	54	27.7	10	5.1	2.9	1.0
4	If I enter the park I will stay within the allowed area only;	23	11.8	53	27.2	92	47.2	27	13.8	2.4	1.0
5	I will not allow children or domestic animals to move freely in the reserve;	3	1.5	18	9.2	87	44.6	87	44.6	1.7	0.8
6	I am a member of an environmental Organisation or club in the park	4	2.1	9	4.6	78	40.0	104	53.3	1.6	0.8
7	I listen or read about issues on plants animals and environment;	46	23.6	106	54.4	30	15.4	13	6.7	2.9	0.9
8	I contribute voluntarily in one way or the other for the conservation of the park	31	15.9	122	62.6	25	12.8	17	8.7	2.9	0.9
9	I talk with friends about problems and issues relating to the park and the environment;	38	19.5	120	61.5	24	12.3	13	6.7	2.9	0.9
10	I have corrected someone before about illegal hunting and destructive behaviours to the park	54	27.7	94	48.2	30	15.4	17	8.7	2.9	1.0

Source: Field work 2016, Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD)

Table 7. Ecological behaviour of the rural publics of Yankari game reserve (Okomu=195, Yanakari=204)

SN	Scale items	SA		A		D		SD		Weighted	
		F	%	F	%	F	%	F	%	Mean	Std
1	I use herbicides to control grasses;	96	47.1	102	50.0	4	2.0	2	1.0	3.4	0.7
2	I dispose polythene (Nylon) bags properly after use;	27	13.2	74	36.3	77	37.7	26	12.7	2.5	1.0
3	After a party I make sure the place is clean before leaving;	20	9.8	61	29.9	88	43.1	35	17.2	2.3	1.0
4	If I enter the reserve I will stay within the allowed area only;	63	30.9	124	60.8	7	3.4	10	4.9	3.2	0.8
5	I will not allow children or domestic animals to move freely in the reserve	4	2.0	11	5.4	123	60.3	66	32.4	1.8	0.7
6	I am a member of an environmental Organisation or club in the reserve	3	1.5	10	4.9	142	69.6	49	24.0	1.8	0.7
7	I listen or read about issues on plants animals and environment;	42	20.6	144	70.6	11	5.4	7	3.4	3.1	0.7
8	I contribute voluntarily in one way or the other for the conservation of the reserve	44	21.6	146	71.6	9	4.4	5	2.5	3.1	0.7
9	I talk with friends about problems and issues relating to the reserve and the environment;	54	26.5	135	66.2	9	4.4	6	2.9	3.2	0.7
10	I have corrected someone before about illegal hunting and destructive behaviours to the reserve	62	30.4	86	42.2	33	16.2	23	11.3	2.9	1.1

Summative outcome of ecological behaviour	Okomu		Yankari		Both	
	F	%	F	%	F	%
Positive ecological behaviour	118	60.6	131	64.1	249	62.4

Source: Field work 2016

Table 8. Communities' environmental attitudes and ecological behaviour based on demographic characteristics

Model summary		**R**	**R^2**	**Adjusted R^2**	**SE**		
	Communities' attitudes	0.372	0.139	0.116	0.861		
	Communities' behaviour	0.196	0.038	0.013	0.962		
		Analysis of variance					
		Sum of squares	**df**	**Mean square**	**F**	**Sig.P- value**	
Attitudes	Regression	54.926	10	5.493	6.2	0.000*	
	Residual	341.074	385	0.886	-	-	
	Total	396.000	395		-	-	
Behaviour	Regression	15.199	10	1.520	1.537	0.124	
	Residual	380.801	385	0.989			
	Total	396.000		395	-	-	
		Regression analysis					
Environmental Attitudes	**Independent variable**	**Beta**	**SE**	**df**	**F**	**$t = \sqrt{F}$**	**Sig.**
	P12(Age)	-0.152	0.062	1	5.969	2.44	0.015**
	P13(Sex)	0.097	0.047	1	4.284	2.07	0.039**
	P14(Marital Status)	0.112	0.039	3	8.029	2.83	0.000*
	P15 (Edu. Level)	0.284	0.056	1	25.423	5.04	0.000*
	P17(Income)	-0.009	0.054	1	0.025	0.16	0.874
	P18(Religion)	0.080	0.046	2	3.080	1.75	0.047**
Ecological behaviour	P12 (Age)	-0.065	0.059	1	1.217	1.10	0.271
	P13 (Sex)	0.021	0.043	1	0.249	0.50	0.618
	P14(Marital status)	0.099	0.040	4	6.251	2.50	0.000*
	P15 (Edu. Level)	-0.030	0.059	1	0.257	0.51	0.612
	P17(Income)	-0.134	0.054	1	6.123	2.47	0.014**
	P18(Religion)	0.127	0.056	2	5.148	2.27	0.006**

*Source: Field work 2016, ** highly significant at P<0.05,* Significant at P<0.001*

Table 8 has the statistical result for the categorical regression analysis and the model for predicting environmental attitudes by the independent variables was found to be statistically significant, F (10,385) = 6.2, p <0.001, and accounted for approximately 14% of the variance of environmental attitudes (R^2 = 0.139, Adjusted R^2 = 0.116). The analysis found the association between five of the demographic factors and environmental attitudes to be statistically significant (2 tailed). Furthermore the result show that the regression model for the prediction of ecological behaviour and the six predictors produced a non-significant relationship F (10,385) = 1.537, P > 0.05) with the prediction by the demographic variables contributing only 4% (R2 =0.038, adjusted R2 =0.013) of the variance in ecological behaviour of the host communities.

Five variables (age, gender, marital status, level of education and religion) predicted environmental attitudes. Age had a negative and significant (*β*-0.152, t (385) = 2.44, *P*<0.01) prediction indicating that younger respondents had the tendency towards pro-environmental attitudes. Gender was positive and highly significant (*β*=0.097, t (385) = 2.07, P<0.05) females are more disposed pro-environmental attitude than their male counterpart. Also marital status was positive and significant (*β*=0.112, t (385) = 2.83, P<0.001), pointing toward a more positive attitude from those that are married than the single. Educational level was also positive and significant (*β* = 0.284, t (385) = 5.04, *P*<0.001) predicting that higher levels of education indicated a better outcome of environmental attitude. Religion which was positive and highly significant (*β* = 0.112, t (385) = 1.75, P< 0.05) predicting more pro-environmental attitude from other religious groups than Christianity.

The result also specified that three of the independent variables significantly predicted ecological behaviour of the respondents. Marital status was positive and significant (*β* = 0.099, t (385) = 2.50, *P* < 0.001) pointing out that the married, divorced and widowed were more disposed toward better ecological behaviour than the singles. Income was negative and highly significant (*β* = -0.134, t (385) = 2.47, *P* < 0.05), indicating a better ecological behavioural response from low income earners than the high income earners. Religion was positive and also highly significant (*β* = 0.127, t (385) = 2.27, *P* < 0.05) showing that non-Christians had a better ecological behaviour.

4. DISCUSSION

Majority of the residents fell within the age range of 31-50 years. Similar result was obtained amongst the host communities of Osse River Park in Ondo state, Nigeria (19). Males dominated the respondents, probably due to observed restrictions placed women on religious grounds [11] and the refusal of most to participate in surveys [20]. This also is in line with studies that have shown that men contribute more frequently to environmental activism [2, 4; 5]. Married, divorced or widowed respondents appeared more pro-environmental which maybe as a result of cultural as well as religious factors. Sometimes it is expected that married couples hold more environmentally conscious attitudes and behaviours than their single counterparts due to a potentially more stable lifestyle in terms of habits and patterns. Moreover, societal norms suggest that married couples and parents have a greater inclination towards pro-environmental knowledge, attitudes, and behaviours [6]. Non-formal education and secondary level of education accounted for majority of the respondents having relatively low levels of educations. Szell [20] obtained a similar result among the local residents of Retezat National Park, in Romania. Education has often been found to improve support and attitudes towards conservation [21; 22], although this has not always being found to be the case [23]. Generally the Yankari communities showed a better attitude than the Okomu residents as a consequence their behaviour was also better than OKNP residents. This might not be unconnected to the marked disparity between the predominant religious groups and gender surveyed at respective sites which must have influenced the outcome. Another factor which was unaccounted for was the residence of the respondents while most residents at OKNP were visitors from neighbouring states almost all residents of the Yankari Game Reserve were indigenes of the state, thus the interest in the resource and better attitude and behaviour towards it. However this could be looked into in subsequent studies.

Categorical regression model results revealed that the demographic variables significantly predicted pro-environmental attitude but not pro-ecological behaviour. The predictive power of demographic variables was partially supported by first hypothesis since the variables significantly contributed to environmental attitudes of the residents at the study sites.

However, the variables in the model only accounted for 14% of the variance in environmental attitude and only 4% of variance in behaviour, reminiscing the role of many untested factors.

Consistent with the literatures, younger individuals were more pro-environmental. It is well documented [20,24,2] that youths are shown to support environmental courses, also associations are made between education and current issues with an assumption that the individuals within the current education system, or the younger generations, are more knowledgeable about environmental matters [1] consequently, this finding was expected.

Gender differences emerged in the attitudinal domain but not in behaviour. Females were more pro-environmental than their male counterpart, consistent with other documented literatures [25, 26,27,28]. A speculative explanation to this observation comes from eco-feminist theory which argues that gender role in socialisation promotes females as more nurturing, caring and sensitive, leading them to be more environmentally concerned than men [29,30]. General presumption remains that familial components, including marital status would have a positive effect on pro environmental attitudes and behaviours [1]. An argument could be made that the family unit would inspire more regular habits, including pro-environmental, dispositions and that parents may desire to set a positive example for their children regarding conservation of resources. Divorced and widowed have also had family experiences which likely influenced the positive outcome. Possibly, spouses exert a social pressure by supporting husbands' environmental friendly attitudes, and eventually pro-environmental attitudes and behaviour [31]. Family life cycle environmental education can be used to impact into others about the need for increased responsibility and to instill into them environmental responsibility.

Level of education also emerged as a predictive factor in the attitudinal domain but not in the behaviour domain. The study inferred that respondents with higher levels of education were more pro-environmental. Educational attainment remains a relevant factor to consider. Individuals who possess higher educational accomplishments are often thought to hold a better understanding of environmental issues and therefore may have an elevated sense of concern. While a few studies produce conflicting results, a positive relationship between higher education and pro environmental behavior and knowledge is generally accepted [1,2].

Income level had no influence on environmental attitude consistent with the study by Denis and Pereira [32] in Romania. On the contrary income had influence on ecological behaviour, confirming previous studies that income is not regularly found to predict pro-environmental attitudes and behaviours [33,6]. Low income earners were more pro-environmental than higher income earners. Early research postulated a positive relationship between people's income and pro-environmental attitudes and behaviour because environmental quality was often considered a luxury good for which people have more degrees of freedom to emphasise when their material needs are well satisfied [34; 35]. Notwithstanding the result of this research ratifies previous assertions that low income earners may have similar or even more pro-environmental attitudes [36,37,38], and may be willing to make similar or larger sacrifices for environmental protection partly because they more likely have direct experiences with the consequences of environmental degradation [39].

Religion plays central roles in shaping human behavior and can either encourage or discourage more sustainable human attitudes and behaviours. The research revealed religion to have influenced both environmental attitude and behaviour. Religious beliefs and affiliation are thought to influence various aspects of an individual's opinions and actions. A common hypothesis exists that more religious persons are less likely to think or act in pro-environmental manners [2,9]. Christianity for instance place mankind before nature or the environment in the hierarchy of living organisms and creates the feeling that humans are entitled to the earth's resources [40]. It is no wonder findings show Christians in this research to be less pro-environmental both on the attitude and behaviour domain than the counterpart religious groups.

The research not only confirms the power of demographic variables to predict pro-environmental attitude and behaviour but also helps to gain deep insight into specific sub-factors of the demographic factors that are the proximate causes of behind certain anti-environmental attitudes and behaviour of some marginal groups within the resident communities of the study areas. Therefore results also

supports the second major hypothesis of this research that significant differences exists within sub-factors of demographic variables in prediction of pro-environmental attitude and positive ecological behaviour.

5. CONCLUSION

Yankari residents were more pro-environmental in attitude and behaviour than Okomu residents and demographic variables significantly predicts pro-environmental attitude and accounted 14% of the variance in environmental attitude and only 4% of variance in behaviour. Furthermore, five (5) variables (age, gender, marital status, level of education and religion) were predictors of environmental attitudes while three (3) independent variables significantly predicted ecological behaviour of the residents.

The suggests that understanding the variables that influence the local residents' environmental attitude and behaviour based on peculiarity of the communities and integrating into environmental education, development initiatives and conservation policies is very important in achieving a successful management and functioning of protected areas. This approach will personalise environmental programs for tackling ecological issues if targeted at identified predominant variables is more likely to yield more positive environmental attitudinal and behavioural outcomes than the usual theoretical approach. The study also sheds light on practical insights for policy makers to transform the anti-environmental attitudes and behaviours of host communities by recognising each variable to ensure management success.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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