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Research Paper

Assessment of Zoo's visitor's conservation knowledge in selected Zoos in Nigeria

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ABSTRACT: *Zoo education programmes have both positive and negative impacts on zoo visitors. The paper assessed the impacts of zoo's conservation knowledge/awareness education programmes on zoo visitors in three selected zoos in Nigeria. A set of structured questionnaires was purposively administered to one hundred visitors in each zoo who have paid at least a visit previously to each of the zoos, under the pre-test and post-test research design. Results of zoo visitors' pre-test and post-test on conservation knowledge/awareness was negative in PH Zoo, positive in UI Zoo and negative in Kano Zoo. The t-test result shows there are significant differences in pre-test and post-test scores of tourists' knowledge about the functions of zoos in PH Zoo (-4.468, P<0.05), -2.006, P<0.05in UI Zoo and -5.391, P<0.05 in Kano Zoo. There are significant differences in pre-test and post-test scores of tourists' conservation knowledge (8.262, P < 0.05) in PH Zoo and -3.981, P < 0.05 in UI Zoo. Kruskal-Wallis' result shows that there are significant differences in tourists' test scores for knowledge about functions of zoos (X^2 = 49.830, P < 0.05) and conservation knowledge (X^2 = 65.716, P < 0.05) in the three zoos. It is imperative that the content of zoo education programmes and method of delivery be improved in order to strengthened the positive impacts of zoo conservation education on zoo visitors.*
KEYWORDS: *conservation knowledge, education programme, impacts, zoo visitors*

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I. INTRODUCTION

Zoo's conservation education programmes have been applauded as powerful instruments for entrenching conservation knowledge in zoo visitors as well as creating awareness about conservation efforts and initiatives by different global biodiversity conservation organizations and institutions (MacDonald et al., 2016). The potential of zoos at educating and influencing millions of people to be actively involved in wildlife conservation efforts is huge (Zimmerman, 2010), considering the fact that over 700 million people visit global zoos and aquariums annually (Moss et al., 2014). Zoo's conservation education programmes have been argued to have inspire many zoo visitors into active conservation actions at halting global biodiversity loss (WAZA (2005; Counsell, et al., 2020). For example, the San Diego Zoo offers, educational tours, field trips, summer camps, and many more education related activities to visitors (San Diego Zoo, 2017).

However, the effectiveness of zoo's education programmes in actively promoting conservation knowledge and attitudes among zoo visitors has been challenged by some writers (Acampora, 1998; Falk et al., 2007; Luebke & Matiasek, 2013; Godinez & Fernandez, (2019). Previous empirical studies on the effect of zoo education on zoo visitors by Marino et al., (2010), Dawson & Jensen, (2011) and, Moss & Esson (2013) reveal that zoos have not been able to effectively communicate conservation education to their visitors. Thus, Maynard et al., (2020) reported that zoo conservation education programmes have not been effective at changing and motivating zoo visitors into positive conservation actions. Similarly, Nygren & Ojalammi, (2018), argued that the claim that zoos actually contribute to visitor's conservation knowledge and behavioural changes is inconsequential.

Moreover, the continuous and persistent loss of global biodiversity has also been considered as a measure of ineffectiveness of zoo conservation education on zoo visitors (Bohm et al., 2013). More so, increasing number of vertebrates are listed as threatened and endangered species annually (Hoffmann et al., 2010). Therefore, MacDonald et al., (2016), opined that millions of dollars and staff time invested by several global biodiversity conservation organisations such as the Association of Zoos and Aquariums (AZA) at reversing the trend of global biodiversity loss is a huge failure because more vertebrates are continuously added to threatened and endanger list annually.

In addition, the education programmes of zoo have sometimes been noted to be counterproductive. For example, findings from studies conducted by Smith, (2008) and Adelman et al., (2010), revealed that zoo visitors were actually less knowledgeable about wildlife conservation and also exhibited declining pro-conservation attitudes after visiting zoos.

Similarly, some studies on zoos in Nigeria have been quick to laud zoos as conservation centres and conservation education agents, but none have critically analysed how effective zoos have been in achieving these. For example, Adams & Salome (2014) reported that the Kano Zoo supports education and scientific research. However, their study could not link the effects of the zoo education programmes on visitor's attitudinal changes towards conservation. Likewise, much of the research work on zoological gardens in Nigeria fail to measure the impacts of zoo's conservation educational programmes on visitor's perception, knowledge and understanding of conservation issues. Thus it is important to ascertain the level of change in visitor's conservation knowledge associated with zoo visit, and identify particularly, the effectiveness of conservation education efforts of zoo visitors in Nigeria.

Therefore, the objectives of this paper are to identify conservation education/awareness programmes of the selected zoos, determine the effect of conservation education programmes of the selected zoos on zoo visitors and determine the relationship between the socio-demographic factors of visitors and their responses to zoo education programmes in the selected zoos in Nigeria.

II. METHODOLOGY

2.1 Study Areas

This study was carried out in three (3) selected Zoos located in three distinctive geo-political zones in Nigeria; namely Port Harcourt Zoo (PH Zoo) Rivers State, located in South-South zone, University of Ibadan Zoo (UI Zoo), Oyo State, in South-West zone and Kano Zoo (Gidan Zoo), Kano State, located in North-West zone.

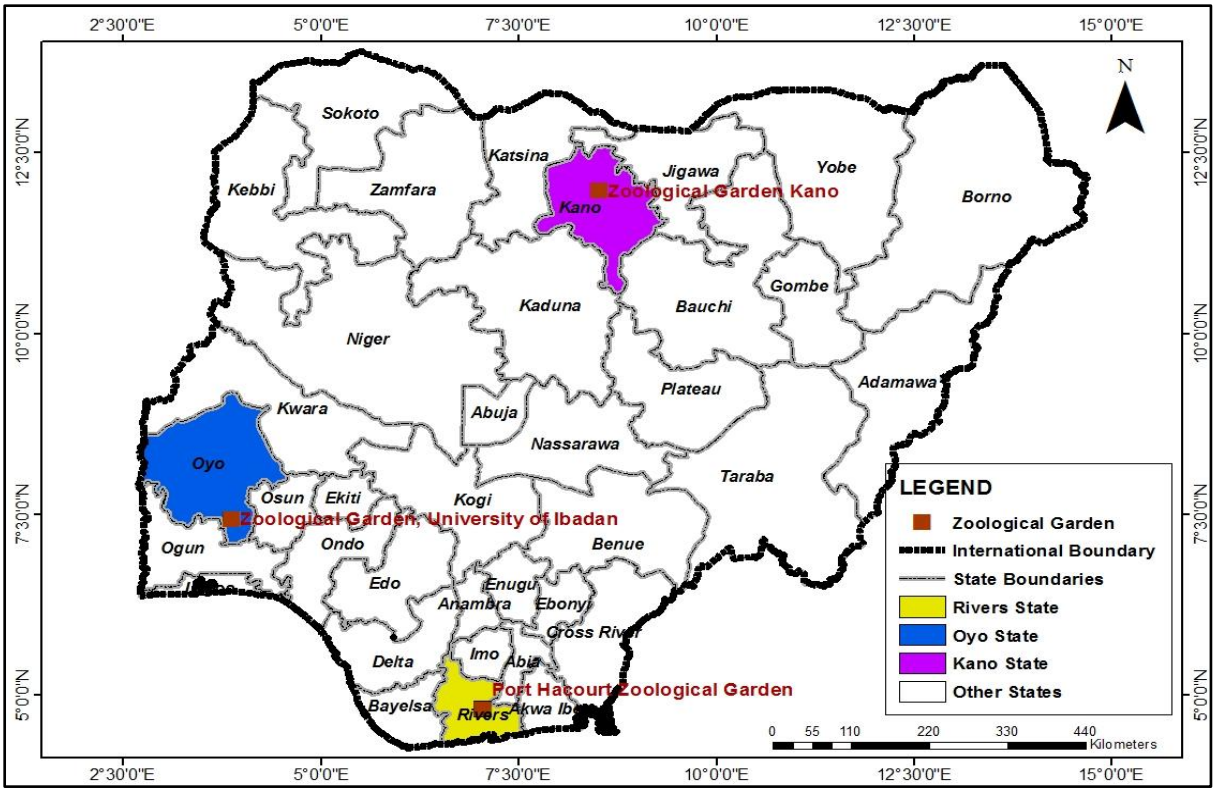

Figure 1: Map of Nigeria showing the study sites
Source: Field Survey, 2019

2.2 PORT HARCOURT ZOOLOGICAL GARDEN (PH ZOO)

Port Harcourt Zoo (PH Zoo), was established in 1974, by the former military governor Alfred Diete-Spiff. It is located in Trans Amadi district of Obio-Akpor local government area, Rivers state. Its tourist attractions include restaurants, a playground, and a museum. It is currently under the management of the Rivers State government through the Ministry of Culture and Tourism, Rivers State (Oladele & Udo, 2017).

2.3 UNIVERSITY OF IBADAN ZOOLOGICAL GARDEN (UI ZOO)

The University of Ibadan Zoo (UI), was founded in 1943, to aid research and training programme for students in the department of zoology, University of Ibadan. It became a zoo in 1974 due to increase in the number of visitors. Its purpose is conservation, education and entertainment. Its tourist attractions include diverse wildlife species, a playground, restaurants and a museum (Sijuade, 1977; Adefalu *et al.,* 2014).

2.4 KANO ZOOLOGICAL GARDEN (KANO ZOO)

Kano Zoo, popularly known as Gidan Zoo, was founded by the late Military Governor of Kano state, Gen. Audu Bako. The foundation stone was laid on the 14th July, 1971, however, the zoo was officially opened to the public in November, 1972. The zoo was established for the purpose of conservation, education, research, and relaxation. It is currently the largest zoo in Nigeria covering a land mass of about 43,000km^2. The zoo presently holds over 57 different wildlife species, amounting to over 200 individual species. Tourist attractions in the zoo include restaurants; children play park, diverse wildlife species and botanical garden. Kano Zoo and Falgore Game Reserve are currently under Kano State Zoological Garden and Wildlife Management Agency, established in 1999 (Sijuade, 1977; Adams & Salome, 2014).

2.5 METHODS OF DATA COLLECTION

Data for the study was collected through the administration of 2 sets of structured questionnaires, visual observations, examination of administrative records and interviews with key personnel of the zoos. The first set was purposively administered to 100% of the management staff in the selected zoos with a minimum of three years working experience in the selected zoos. Hence, five (5) questionnaires were administered to the management staff of the PH Zoo, but only three (3) were retrieved. In UI Zoo, nine (9) questionnaires were administered and eight (8) retrieved. Finally, in Kano Zoo, eighteen (18) questionnaires were administered and 18 retrieved. A total of thirty-two (32) questionnaires were administered to staff respondents and twenty-eight (28) retrieved.

The second set of questionnaires, a modified version of the Association of Zoos and Aquariums (AZA) visitor evaluation toolbox on conservation attitudes adopted by Falk et al., (2007) was purposively administered randomly to one hundred (100) visitors who have paid at least a visit previously to each of the zoos under the pre-test and post-test research design. In all, a total of 300 questionnaires were administered for the study. The reflection method was employed by asking the visitors to compare their pre-visit and post -visit feelings as they entered and exit the zoos in other to determine the changes in their knowledge about wildlife conservation and functions of the zoos. The questionnaires retrieved and analysed for PH Zoo, UI Zoo, and Kano Zoo are ninety-one (91), one hundred (100), and ninety (90) respectively, bringing the total number of sampled visitors to 281. In all, a total of three hundred and thirty-two (332) questionnaires were administered but three hundred and nine (309) were analysed for the study.

2.6 METHOD OF DATA ANALYSIS

The data obtained from the survey was analysed by descriptive statistics using frequencies and percentages and tables. The difference between pre- and post-test results was tested for statistical significance with t-test. Kruskal-Wallis rank test was used to test for significant difference between the scores of the three study sites. Spearman Rank correlation test was used to test for relationship between visitors' socio-demographic characteristics and their scores. The Statistical Package for Social Sciences (SPSS), version 16.0 was used to run these analyses.

III. EMPIRICAL RESULTS

Table 1 shows the pre-test and post-test results on the perceived functions of zoos by the visitor respondents in the three zoos. In PH Zoo, the consciousness of zoo visitors about the functions of zoos as caring centre for wild animals decreased (-27.45%) after the post-test but increased in both UI (3.96%) and Kano Zoos (20.24%), educating the public on conservation also decreased after post-test in PH Zoo (-53.70%) but increased in UI Zoo (5.08%) and Kano Zoo (4.62%). The function of zoos as breeding centres of wild animals decreased in PH Zoo (-16.67%), increased in UI Zoo (11.72%) and Kano Zoo (18.37%). The perception of zoos as breeding centres of endangered wildlife species decreased in PH Zoo (-22.06%), increased in UI (6.19%) and Kano Zoos (18.37%).

Table 1: Visitor's Pre-test and Post-test results on the perceived functions of zoos by the visitor respondents in the three zoos.

Location	PH Zoo			UI Zoo			Kano Zoo		
Variables	Pre-test	Post-test	Difference (%)	Pre-test	Post-test	Difference (%)	Pre-test	Post-test	Difference (%)
Caring for animals in the zoo	510	370	-27.45	606	630	3.96	504	600	20.24
Educating the public about conservation issues such as threatened species	540	250	-53.70	551	579	5.08	455	476	4.62
Breeding animals in the zoo regardless of whether they are endangered or not	300	250	-16.67	430	480	11.63	343	406	18.37
Breeding endangered animals in the zoo	340	265	-22.06	435	486	11.72	350	399	14
Providing a fun day out for the public	575	570	-0.87	624	640	2.56	511	560	9.59
Reintroducing endangered animals into the wild that were bread in zoos	220	195	-11.36	452	480	6.19	378	336	-11.11
Carrying out and supporting conservation projects outside of the zoo to conserve wild animals	370	325	-12.16	484	512	5.79	322	364	13.04
Providing expert training for keepers/staff/conservationists	485	510	5.15	569	599	5.27	434	504	16.13
Donations to conservation organizations/projects	415	350	-15.66	456	490	7.46	329	399	21.28
Scientific research	530	570	7.55	583	608	4.29	406	525	29.31

Source: Field Survey, 2019

Table 2 presents pre-test and post-test of visitor's knowledge about conservation education in the selected zoos. Parameters such as "being at the zoo is fun" decreased in PH Zoo (-43.40%), but increased in UI Zoo (11.94%) and Kano Zoo (11.94%), and "I am part of the problems with nature" was zero in PH Zoo, increased in UI Zoo (3.75%) and decreased (-7.14%) in Kano Zoo. Also, the parameters "I am part of the solutions to nature's problems" was negative in PH Zoo (-0.90%), positive in UI Zoo (6.16%) and negative in Kano Zoo (-8.62%) and "Zoos care about animals" decreased significantly in PH Zoo (-43.48%) but positive (1.66%) and (3.23%) in UI Zoo and Kano Zoo respectively. "Zoos are important for wildlife conservation" was negative (-35.71%) in PH Zoo, positive in UI Zoo (3.05%) and Kano Zoo (22.22%). The parameter "we need to help protect wildlife" increased in PH Zoo (5.63%) and UI Zoo (6.0%) but negative (-1.41%) in Kano Zoo.

Table 2: Pre-test and post-test of visitor's knowledge about conservation education in the selected zoos

Location	P.H. Zoo			U.I. Zoo			Kano Zoo		
Parameter	Pre-test	Post-test	Difference (%)	Pre-test	Post-test	Difference (%)	Pre-test	Post-test	Difference (%)
Being at the zoo is fun	530	300	-43.40	561	628	11.94	532	553	3.95
I am part of the problems with nature	245	245	0	267	277	3.75	196	182	-7.14
I am part of the solutions to nature's problems	550	545	-0.90	529	564	6.16	406	371	-8.62
Zoos care about wild animals	460	260	-43.48	603	613	1.66	434	448	3.23
Zoos are important for wildlife conservation	420	270	-35.71	591	609	3.05	378	462	22.22
We need to help protect wild animals	585	615	5.13	617	645	6	497	490	-1.41
We need to help protect plants	590	615	4.24	632	633	0.16	518	490	-5.41
There is a lot I can do to conserve	455	475	4.40	475	444	-6.53	357	343	-3.92
Nature helps define Nigeria's national heritage and character	500	545	9	590	615	4.24	546	483	-11.54
Nature is a place to renew the human spirit	377	545	44.56	589	621	5.43	553	539	-2.53
We have the	535	555	3.74	627	651	3.83	532	497	-6.58

responsibility to leave healthy ecosystems for our families and future generations									

Source: Field survey, 2019

Table 3 shows the t-test result shows the pre-test and post-test scores for functions of zoos (t value = 4.468, P<0.05 and conservation knowledge (t value = 8.262, P < 0.05) in PH Zoo. In UI Zoo, the t-test analysis for pre-test and post-test scores for functions of zoos was (t value = -2.006, P<0.05) and conservation knowledge (t value = -3.981, P < 0.05). The t-test analysis in Kano Zoo, for both the pre-test and post-test scores for functions of zoos were (t value = -5.391, P<0.05, for the pre-test and (t value = 1, P > 0.05) as post-test scores for conservation knowledge.

Table3: Summary of t-test analysis measuring the differences in pre and post visits knowledge of visitor respondents on the functions of zoos and conservation education in the selected zoos.

Variables	Mean	Standard deviation	Standard Error Mean	t value	Df	P Values	Significance	Inference
PH Zoo								
Roles of Zoos (Pre-test scores)- (Post -test scores)	4.66667	9.90970	1.04457	4.468	89	0.000	P <0.05	Significant
Conservation education. (Pre-test scores)- (Post-test scores)	5.16667	5.93267	0.62536	8.262	89	0.00	P <0.05	Significant
UI Zoo								
Functions of Zoos (Pre-test scores)- Post -test Scores)	-3.21000	9.90970	1.04457	-1.006	98	0.048	P < 0.05	Significant
Conservation education (Pre-test scores) - (Post -test) scores)	-2.7000	5.93267	0.62536	-3.981	99	0.00	P < 0.05	Significant
Kano Zoo								
Functions of zoos (Pre-test scores) – (Post-test scores)	-5.391	4.55955	0.53040	-10.173	73	0.000	P < 0.05	Significant
Conservation knowledge (Pre-test scores)- (Post-test cores).	1	8.33543	0.96897	1.032	72	0.305	P > 0.05	Not significant

Source: Field survey, 2019

Table 4 presents results for the Kruskal-Wallis Non-parametric analysis for the different scores amongst the three locations. The table shows that there is a significant difference amongst the test scores for conservation learning for the three locations (X^2 = 65.716, P < 0.05), and test scores for zoo function learning ($\mathcal{X}^2$ = 49.830, P < 0.05).

Table 4: Summary of Kruskal-Wallis Non-parametric analysis for the different scores in the three zoos

Parameter	Calculated chi-square value	P value	Significance	Inference
Test scores for conservation knowledge score for the three zoos	65.716	0.000	P < 0.05	There is significant difference in the test scores for the three zoos
Test scores for function of zoos for the three zoos	49.830	0.000	P < 0.05	There is significant difference for the test scores for the three zoos

Source: Field survey, 2019

Table 5 shows methods employed by the various zoos in educating their visitors about wildlife conservation. Interactive displays, is the most used method in educating visitors in PH Zoo (100%), while animal shows (94.4%) is the most used method in Kano Zoo and illustrated species talk (85.7%) the most used method in UI Zoo.

Table 5: Conservation Education Programmes of the selected zoos as indicated by staff respondents

Variables		PH Zoo Frequency	Percentage %	UI Zoo Frequency	Percentage %	Kano Zoo Frequency	Percentage %
Animal Shows	Yes	1	33.3	2	28.6	17	94.4
	No	2	66.7	5	71.4	1	5.6
	Total	**3**	**100**	**7**	**100**	**18**	**100**
Animal Handling	Yes	1	33.3	2	71.4	11	61.1
	No	2	66.7	5	28.6	7	38.9
	Total	**3**	**100**	**7**	**100**	**18**	**100**
Keeper Talks	Yes	2	66.7	2	28.6	9	50.0
	No	1	33.3	5	71.4	9	50.0
	Total	**3**	**100**	**7**	**100**	**18**	**100**
Guided Tours	Yes	2	66.7	4	57.1	13	77.8
	No	1	33.3	3	42.9	4	22.2
	Total	**3**	**100**	**7**	**100**	**18**	**100**
Illustrated Species Talk	Yes	1	33.3	1	14.3	6	33.3
	No	2	66.7	6	85.7	12	66.7
	Total	**3**	**100**	**7**	**100**	**18**	**100**
Interactive displays	Yes	0	0	2	28.6	6	33.3
	No	3	100	5	71.4	12	66.7
	Total	**3**	**100**	**7**	**100**	**18**	**100**

Source: Field Survey, 2019

Table 6 showing the number of students from elementary to tertiary levels of education school pupils to educated in Kano Zoo from 2009 to 2018. The peak months for all the years were March and July. On average, 36,594 students have been trained by the zoo every year since 2009.

Table 6: Number of students educated in Kano Zoo between 2009 to 2018

Variables	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018*
Jan	1274	259	150	0	928	559	276	1202	2195	1574
Feb	3525	1684	1267	463	4696	3592	1975	9430	8799	9872
Mar	3236	4715	4174	1850	5248	8340	2606	17090	18119	21110
Apr	1724	2469	1357	484	3238	2642	296	5564	6568	4159
May	1305	301	1024	863	1531	3831	4432	5144	5085	4480
Jun	4891	1980	4136	3355	5876	9386	11667	2782	434	813
Jul	4838	5891	6913	5375	2895	122	414	4479	4451	0
Aug	3350	2702	963	412	0	0	1877	607	9316	0
Sep	24	80	178	317	211	55	2537	0	362	0
Oct	285	841	1177	7643	1369	121	1478	1542	885	0
Nov	1161	66	2182	2283	3813	1089	4243	5079	9806	0
Dec	556	1052	792	1843	3537	993	2237	4586	3887	0
Total	27179	22040	24313	24888	33342	30730	34038	57505	69907	42008

Source: Field Survey, 2019
*Incomplete

Table 7 shows the result for the spearman's rank correlation for test of significant relationship between socio-demographic characteristics and conservation learning and function learning of visitors in the three zoos. In UI Zoo, there are no significant relationship between sex and conservation learning, sex and function learning, age and function learning, education and function learning, occupation and conservation learning, and occupation and function learning ($P > 0.05$). However, there were significant relationships between Age and Conservation learning, education and conservation learning ($P < 0.05$). Amongst visitor respondents of the Kano Zoo, sex and conservation learning, sex and function learning, and occupation and function learning had no significant relationship $P > 0.05$, but age and conservation learning. Age and function learning, education and conservation learning, education and function learning, occupation and conservation learning, age and conservation learning all had significant relationships. In P.H. zoo, there was no significant relationship between sex and conservation learning, sex and function learning, age and function learning, education and conservation learning, occupation and conservation learning, occupation and function learning ($P > 0.05$), while age and conservation learning, education and function learning had significant relationships ($P < 0.05$).

Table 7: Summary of Spearman's rank correlation analysis testing for relationship between demographic and pre-test post-test scores amongst visitor respondents in the three zoos.

Location	Variables	Correlation coefficient	P values	Significance	Inference
UI Zoo	Sex and Conservation learning	-0.005	0.958	P > 0.05	Not significant
	Sex and Function learning	-0.113	0.264	P > 0.05	Not significant
	Age and Conservation learning	-0.276	0.005	P≤ 0.05	Significant
	Age and Function learning	-0.014	0.893	P > 0.05	Not significant
	Education and Conservation learning	0.202	0.043	P < 0.05	Significant

	Education and function learning	0.077	0.446	P > 0.05	Not significant
	Occupation and Conservation learning	0.044	0.664	P>0.05	Not significant
	Occupation and Function learning	0.017	0.863	P>0.05	Not significant
Kano Zoo	Sex and Conservation learning	-0.135	0.203	P> 0.05	Not significant
	Sex and Function learning	0.000	1.0	P>0.05	Not significant
	Age and Conservation learning	-0.314	0.002	P < 0.05	Significant
	Age and Function learning	0.281	0.007	P < 0.05	Significant
	Education and Conservation learning	0.671	0.000	P < 0.05	Significant
	Education and function learning	0.331	0.001	P < 0.05	Significant
	Occupation and Conservation learning	-0.374	0.000	P < 0.05	Significant
	Occupation and Function learning	-0.064	0.547	P > 0.05	Not significant
PH Zoo	Sex and Conservation learning	0.187	0.077	P > 0.05	Not significant
	Sex and function learning	0.055	0.606	P > 0.05	Not significant
	Age and conservation learning	-0.303	0.004	P < 0.05	Significant
	Age and function learning	0.024	0.824	P>.05	Not significant
	Education and conservation learning	-0.106	0.318	P > 0.05	Not significant
	Education and Function learning	0.364	0.000	P < 0.05	Significant
	Occupation and Conservation learning	0,189	0.074	P > 0.05	Not significant
	Occupation and function learning	-0.192	0.070	P > 0.05	Not significant

Source: Field survey, 2019

IV. DISCUSSION

4.1 Effect of zoo conservation education on Zoo visitors' knowledge

Results from the study show that visit to the zoos have quantifiable positive and negative impact on zoo visitor's understanding of conservation issues and the roles of zoos in wildlife conservation. Port Harcourt Zoo visitors experienced reduction in their knowledge about the functions of zoos and conservation knowledge after visiting the zoo (Tables 1 and 2). The level of satisfaction of zoo visitors especially concerning the state of the animal, the manner they are display and overall welfare of zoo animals have serious impact on visitors' perception of zoos. Packer (2018), similarly noted that visitors often make judgements on whether the animals in the zoo are well cared for through ratings of the animal's perceived health conditions. PH Zoo has the highest levels of dissatisfaction in all the three zoos as 50% of the visitors claimed they were unsatisfied while 16.7% were highly unsatisfied (Figure 1). Visitor's individual action messages such as "Zoos care about animals" "zoos are important for wildlife conservation", reduced considerably as a consequence of their visit (Table 2).

Also, there is a significant decrease in the visitor's perception of the functions of the zoo. Visitors to the Port Harcourt zoo felt that caring for animals, educating the public about conservation issues, breeding of endangered animals, and reintroduction of species into the wild are not important functions of the zoo (Table 1). This can be attributed to poor zoo education programme and poor zoo experience. The zoo may have been considered a poor leaning environment about environmental education by the visitors because of the condition of the zoo. Consequently, this shows that a poor performing zoo can reduce visitors' positive orientation towards zoos. Nevertheless, this may also have buttressed the fact that zoo visitors care so much about entertainment rather than learning about zoo and zoo animals as reported by Carr & Cohen, 2011) as well as Roe & McConney (2015). The results of their studies show that visitors were usually concerned primarily with viewing animals and show poor interest in learning about them. The poor state of the zoo could also have heightened the need for biodiversity conservation in the minds of the zoo visitors which was reflected in their responses. There was a decrease in action messages and the study further reveals that zoo visitors can learn about conservation in a zoo, without learning about the role they can play and actions they can take to help conserve biodiversity. However, in UI Zoo, visitor's knowledge and attitude towards conservation, and the functions of the zoo significantly improved due to their visit (Table 1 and Table2). However, visitors experienced increase in their Pro conservation thoughts. This corroborates the findings of Nickels (2008) and Falk et al. (2007) who reported that visitors to zoos leave with a significantly increased conservation attitude post visiting, becoming more aware of their role in environmental problems. Results also show that visiting zoos strengthened their knowledge of the functions of zoos, with significant increase in their perception that "Caring for animals in the zoo is good", "Educating the public about conservation issues such as threatened species", "Breeding endangered animals in the zoo", are important functions of the zoo (Table 1).

There was no statistically significant change in visitors understanding of conservation due to their visit in Kano Zoo (Table 3). As observed by Falk et al, (2007), some zoo visitors have a broader understanding of biodiversity than realized, and as such, changes ascribed to their visits are intangible and not statistically different. Nevertheless, visits to the zoo still strengthens the values of the visitors, as in the case of Kano Zoo where visitors experienced 3% and 22.2% increase in their perception that zoos care about animals, and that zoos are important for wildlife conservation, respectively (Table 2).

Nevertheless, t-test (Table 3) and Kruskal-Wallis analysis measuring the differences in the pre-test and post-test scores of visitors' zoo function and conservation knowledge test scores for visitors in the three zoos

(Table 4) show significant differences. The results of the study clearly reinforced the perception that zoo visitors often become less knowledgeable about the functions of zoos after zoo visit. The result of the study further shows that many zoo visitors are usually less interested in learning about animals on display in various zoos because they visit zoos primarily for entertainment which was similarly reported by Luebke et al., (2016). The result of this study agrees with the findings of Marino et al., (2010) on their review of impact of zoo visit on the attitudinal changes of American zoo visitors. Their study revealed that knowledge about zoo animals and environmental conservation attitudes actually decline after zoo visits. Since many zoo visitors are in the zoos primarily to be entertained by the captive zoo animals. Hence, they concentrate on the entertainment and funny antics of captive animals which often captivate their attention rather than the zoo conservation education efforts as affirmed by Ludwig (1981).

4.2 Conservation education/ training programmes in the Selected Zoos

The result of the study revealed that the three zoos employed animal shows, animal handling, keeper talks, guided tours, illustrated species talk and interactive displays to educate their visitors as shown in Table 5. The study also shows that interactive displays, is the most used method in educating visitors in PH Zoo, while animal shows and illustrated species talk are the most used methods in Kano and UI Zoos. These methods differ from the one employed by the San Diego Zoo (San Diego Zoo, 2017). The selected zoological gardens educate students from primary to tertiary institutions on visit to the zoo. Majority of the zoo staff respondents in the three zoos indicated that visitors on excursion trips to the zoos are educated on conservation education through guided tours. In Kano Zoo, an average of 36,594 students have been educated on conservation and the role of zoos, annually since 2009 till 2019 (Table 6). However, it is very clear from the responses of the zoo visitors that these methods are not really effective at achieving the actual goals of entrenching conservation awareness in zoo visitors towards influencing them into taking conservation actions. It could also suggest that the programmes were poorly delivered such that visitors might perceived these programmes as part of the entertaining programmes of the zoos.

4.3 Effect of socio-demographic Factors on visitors learning

In all the three zoos, visitors' gender was not found to be significantly related to their conservation knowledge learning or function of zoo learning. This is contrary to the findings of Powell and Bullock (2014) who reported that female visitors had stronger emotional experiences in the zoo than their male counterparts. In all the three zoos, Spearman's rho showed significant weak negative linear relationship between visitor's age and their conservation learning ($P \leq 0.05$) (Table 9). This implies that as the visitor's ages across the zoos increased, their conservation learning decreased. Younger adults tend to explore zoos more, read animals tags, and spend more time viewing each animal. This disagrees with the work of Powell and Bullock (2014) where young adults were observed to have reduced positive emotional response than elderly participants. Education was seen to have a significant weak positive linear relationship with function learning in UI Zoo and in PH Zoo ($P < 0.05$) (Table 7). However, the relationship between education and conservation learning in UI Zoo was strongly positive. This implies that conservation knowledge and zoo function learning are related to visitor's educational qualification. Similarly, visitors to Dundee's Discovery Point Exhibition shows that zoo visitors with higher educational qualification had higher learning index (Prentice et al., 1998). This implies that the higher the educational level of visitors, the higher their conservation knowledge (Table 7).

V. CONCLUSION

The study revealed that the conservation education programmes of the selected zoos are ineffective at encouraging pro-conservation actions among zoo visitors' and have both positive and negative impacts on the conservation knowledge of zoo visitors. The positive effect on the conservation knowledge among zoo visitors in UI and Kano Zoos is slim. However, the study shows that PH Zoo visitors experienced serious negative changes in their knowledge about conservation and functions of zoos after their visit to the zoo. PH Zoo visitors moved from thinking zoos are important for wildlife conservation before visit, to rejecting that belief after visit.

VI. RECOMMENDATIONS

It is important that further research into factors responsible for the widening gap between pre-visit and post-visit scores of zoo visitors be conducted. It is also very important that the content of education programmes of Nigerian Zoos and method of delivery be investigated in order to improve and strengthened the positive impacts of zoo education on zoo visitors

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