Effect of Tourist Participation on the Behavioural Pattern of Captive Chimpanzee *(Pan troglodotyde ellioti* (Matschie, 1914)) in Makurdi Zoological Garden, Nigeria

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ABSTRACT

Knowledge on the behavioural pattern of fauna species help to maintain good relationship with captive animals. Chimpanzee behavioural pattern differs in many ways with human interactions. The research focused on the effects of tourist participation on Chimpanzee behavior in a captive environment. Fifty copies of Semi-structured questionnaire were administered to the tourist. Chimpanzee activities and interactions with tourists was carried out using standard focal sampling method at 5 minutes interval for 2 days per week for two months. Data were analyzed using descriptive statistics, Mantel-Haenszel $\chi2$ and Cochran-Mantel-Haenszel (CMH) M^2 test. The study reveals that majority of the respondents were males (60%) and were first timers who came for the purpose of relaxation and research. The probability of return visit by the respondents was low, due to poor rating of the Zoo. Most of chimpanzee time was spent resting, sitting and standing (29.5%, 23.2% and 17.0%), respectively. The locomotive and display behavioural pattern were statistically significant (p-value = 0.042 and 0.042) at contact and non-contact level. However, there was no statistically difference with the relieve behavioural pattern exhibited by the Chimpanzee, which indicates that, the relieved behaviour observed was independent of non-contact and contact between the Chimpanzee.

Keywords: Tourists, captive environment, Chimpanzee, human-animal interaction, *Pan troglodotyde ellioti,* Makurdi Zoological Garden

1. INTRODUCTION

Primates are one of the closest animals that attract enormous tourist's attention especially during festive period in captive environment. They exhibit a high level of intelligence and are socio species of animals. They play a vital role in education and research in many related areas [1, 2]. All primates have common adaptation to live on trees and share the ability to climb by grappling. Primates have evolved distinct behavioral pattern that led to development of abnormal behaviours and stress which causes frustration or boredom, while, undermining their individual welfare and success in breeding [3, 4].

Captive environment can create unnatural social that are restricted and relatively predictable. When they are relocated to climates that differ from native ones, they may deprive of certain environmental stimuli for expression of species-specific behaviour [2]. Captive populations, potentially serve as buffers against extinction towards reintroduction into the wild. However, zoo animal populations face reproductive challenges which have so far inhibited them from serving as viable reserve populations [5].

The establishment of zoological garden in a society is premised partly on the idea of bringing man close to wild animal species [6]. In most parts of Central and West Africa, such as Nigeria, zoological gardens are the most visited wildlife tourism destinations when compared to in-situ conservation sites like National parks and Game reserves [1], thus contributing significantly to the nation's tourism industry.

Zoological gardens have the capacity to host an enormous number of people and influence their perception of animal welfare and their habitat [2]. Zoological animal populations are managed to educate the public on wildlife, especially endangered species while engaging in captive breeding and reintroduction programs [7].

Chimpanzees (*Pan troglodotyde ellioti*) are an exceptionally charismatic species that share many characteristics with humans [2]. As a result, Chimpanzees have been a popular animal to exhibit in captivity. Their unique social structure, complex intelligence and aggressive tendencies have proven to be a challenge to animal keepers in captivity. According to [8], when Chimpanzees are deprived of proper social environments, most especially those living in isolation, they show extreme levels of aberrant behaviors, which include social and cognitive deficits.

Captive facilities holding Chimpanzees and other non-human primates are mandated by law to provide adequate care and provisions (dietary, social and environmental enrichment) to promote species-typical behaviors and enhanced the psychological well-being of the residents [2]. Human related activities that are prone to negative effect on the animal should be avoided.

Animals are prone to exhibit abnormal behavior on account of activities of tourists. The data regarding behavioral studies of Chimpanzee in captive environment is limited. Understanding this behavior is essential to human-Wild animal interaction while ensuring that potential stressors in the zoo environment are identified and minimized.

2. MATERIALS AND METHODS

2. 1. Study Area

The study was carried out in Makurdi Zoological Garden (now named Riverville Restort) under the ministry of commerce, culture and tourism and situated in the eastern part of Makurdi

town, sand-witched within Benue State University, Makurdi. It is located within the Guinea savannah zone between latitude 70°E and 75°N and longitude 80° and 80°N [9]. It is on the southern bank of river Benue and about 1.5km along Makurdi-Gboko express road and covers about 25 hectares of land [10]. Annual temperature fluctuates between 21^{0c} to 37^{0c} and the vegetation cover could be described as a high-density forest. The Garden provides a cool, quiet and secure environment for tourists [6].

2. 2. Method of Data Collection

Data on tourist inflow was collected using semi- structured questionnaire. fifty questionnaire were administered to the tourist that are in close encountered to the Chimpanzee's to determine the effect of Chimpanzee behavioral pattern observed through Standard focal sampling adopted by [11]. The behavior exhibited by the chimpanzee was recorded at 5-minute interval over duration of 6 hours between 9-11am (Morning) 1-3 pm (Evening). Data collection was carried out in two days per week between July to August, 2021.

2. 3. Data Analysis

Descriptive statistics, Mantel-Haenszel (χ2) and Cochran-Mantel-Haenszel (CMH) M^2 test were used. The appropriateness of both the Mantel-Haenszel χ2 and CMH tests for the contingency tables was determined by using the Woolf test. Statistical result of (Woolf tests) shows that the CMH test was appropriate for the three-way contingency tables at ($p > 0.05$).

3. RESULTS

3. 1. Behavioural pattern exhibited by the Chimpanzee

The Chimpanzee (*Pan troglodotyde ellioti)* exhibited fourteen (14) different activities (behavioural pattern) during 96.5 hours of observation each for both morning and evening survey (Figure 1 and 2). The vast Chimpanzee time was spent resting, sitting and standing (29.5%, 23.2% and 17.0%), respectively by non-contact level. At the contact level, the Chimpanzee time was spent more on feeding and displaying (23.3%), respectively at the morning hours of observation. At evening hours of observation, the Chimpanzee time was spent more on standing, sitting and resting (29.8%, 27.3% and 17.4%), respectively as opposed the morning observations for non-contact with the tourists. At the contact level, the Chimpanzee time was spent standing, feeding and displaying (21.7%, 17.4% and 17.4%), respectively.

3. 2. Tourists' inflow and perception

The result of the demographic characteristics of the tourists is presented in Table 1. It reveals that, 60% of the tourists were males, while 40% were females. Majority (40%) of the tourists were between the age bracket of 26-30 years and the least age was <15 years (4%). The result also reveals that, 74% of the tourist attends Tertiary level of education, while the least (4%) attended primary level. The majority (34%) of the tourist were students. 70% of them are Christian faith, while 30% of them were Muslims.

Most of the tourists (80%) came to relax, followed by educational desire/drive (14%). The response from the tourists indicated that (90%) rated the zoo facilities and fauna species to be of low standard, while about (56%) them visited the zoological garden as first timer.
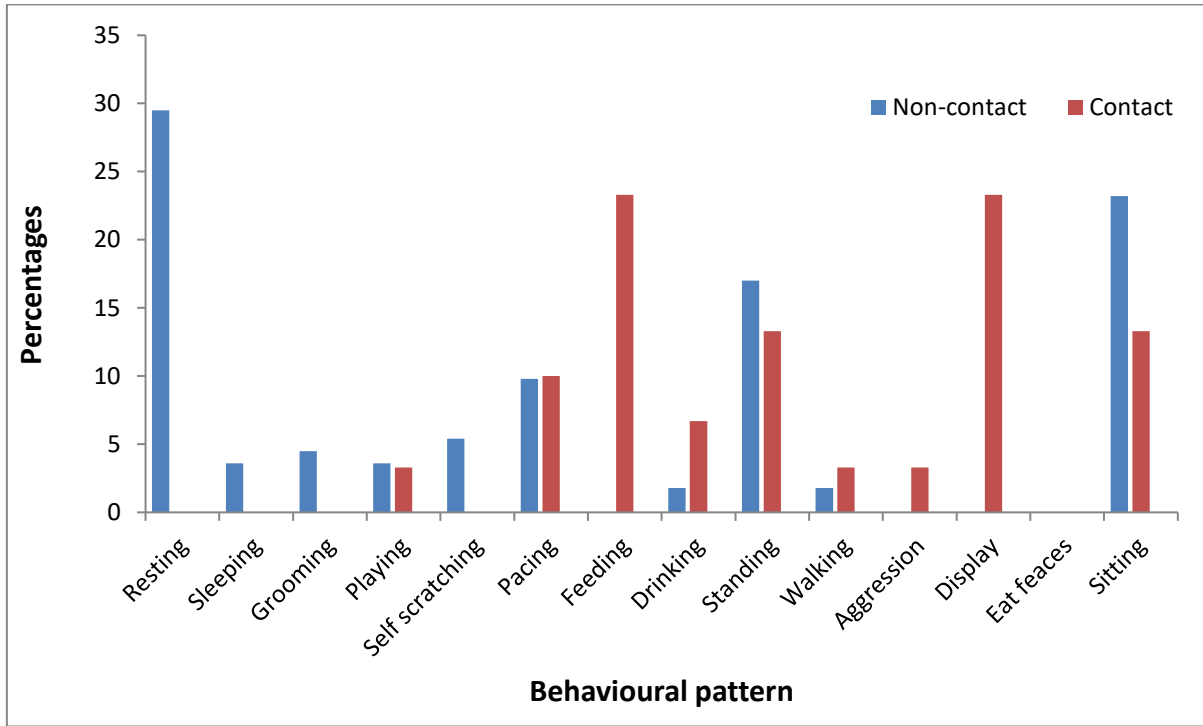
Figure 1. Chimpanzee behavioural pattern and tourist's interaction in Morning Observations.
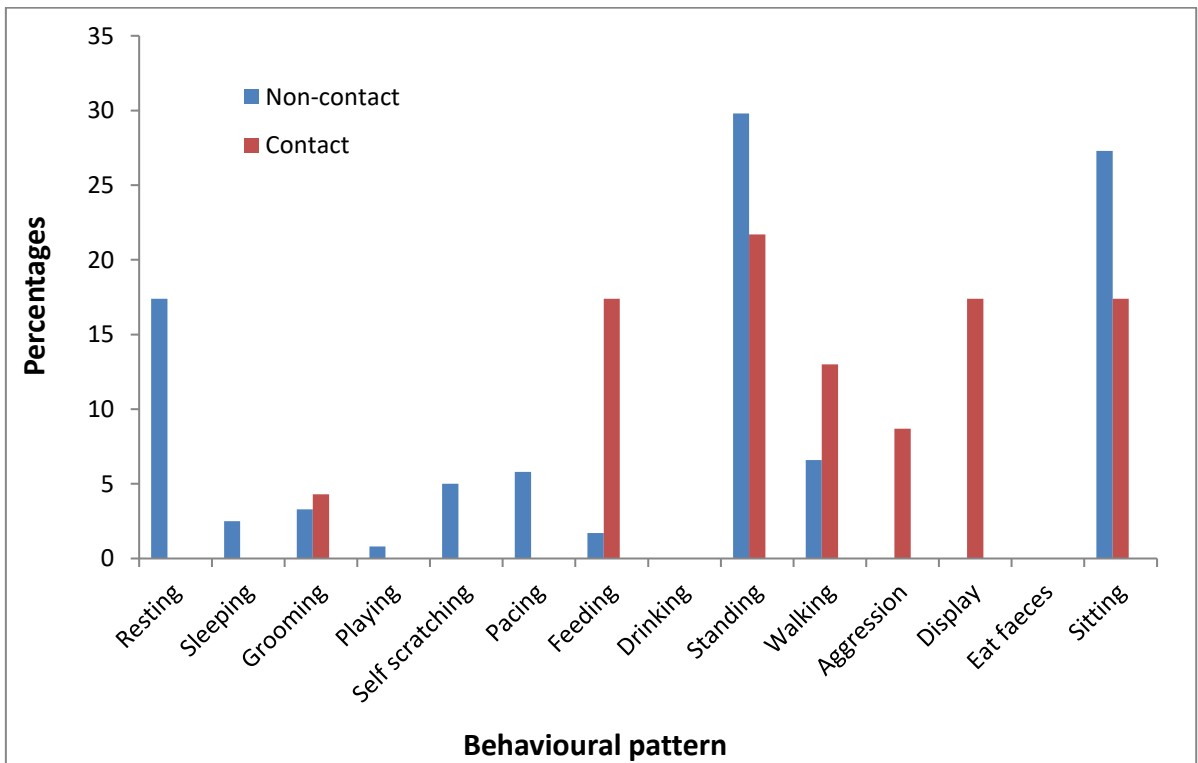
Figure 2. Chimpanzee behavioural pattern and tourist's interaction in Evening Observations

Table 1. Demographic Statistics of Tourists in Makurdi Zoological Garden (n = 50).

Parameters	Variables	Frequency	Percentage
Gender	Male	30	60
	Female	20	40
Age (years)	<15	02	04
	16-20	03	06
	21-25	10	20
	26-30	20	40
	>30	15	30
Educational level	Primary	02	04
	Secondary	11	22
	Tertiary	37	74
Occupation	Student	17	34
	Civil servant	07	14
	Businessmen	11	22
Religion	Christianity	35	70
	Islam	15	30
	Others	00	00

Table 2. Experience/ Purpose of Visit by Tourist to Makurdi Zoological Garden

Parameters	Variable	Frequency	Percentage
Purpose of visit to the zoo	Education	07	14
	Research	03	06
	Relaxation	40	80
How will you rate the zoo based on facilities and Fauna species	Excellent	00	00
	Very Good	00	00

	Good	05	10
	Poor	45	90
	Very Poor	00	00
Is this your first-time visit to the zoo	Yes	28	56
	No	22	44
Did you have Interaction with the chimpanzee	Yes	50	100
	No	00	00
What Kind of interaction	Feed it	08	16
	Played with it	10	20
	Watched it display only	32	64
Which Behavioural display interested you the most	Standing/grooming	10	20
	Sitting	09	18
	Jumping/dancing	20	40
	Eating	08	16
	Sleeping	03	06
How would you categories the behavioural pattern of the Chimpanzee	Normal	30	60
	Abnormal	20	40
Did you find the Chimpanzee Entertaining	Yes	46	92
	No	04	08

Table 3. Tendency to Revisit the Zoo and Expectation in Makurdi Zoological Garden.

Parameters	**Variable**	**Frequency**	**Percentage**
Would you like to revisit the Zoo	Yes	18	36
	No	32	64
How would you rate the Enclosure and Enrichment of the Chimpanzee/ Environment	Excellent	00	00
	Very Good	00	00

	Good	01	02
	Poor	48	96
	Very Poor	01	02
What are your Recommendations on how to improve the standard of the Chimpanzee and Zoo setting at large	Health Care	10	20
	Feeding	10	20
	Cleaning/Enrichment of Enclosure	25	50
	Stocking of different wild animals and a Mate	05	10

The entire tourists (100%) had interactions with the Chimpanzee (64%) of them watched its display exhibited by the animal, (20%) of them played with the species, (16%) of them fed the Chimpanzee; (40%) of the tourists were interested in jumping/ dancing of the animal behavior exhibited, followed by standing/ grooming (20%), eating (18%), sitting (16%) and sleeping (6%). Majority of the tourists viewed the Chimpanzee behavior as Normal (60%), while 40% felt it was Abnormal. Most of the tourists found the Chimpanzee to be entertaining (92%) (Table 2).

The feedback from the tourists shows that the probability revisiting and their expectation given on the status of the zoological garden was observed in Table 3. It was revealed that most of them (64%) had no intentions to revisit the zoological garden, while (36%) of them would like to revisit. Majority (96%) of tourists rated the enrichment and enclosure of the zoological garden being Poor. Recommendation on how to improve the standard of the zoological garden at large were made by the tourist such as cleaning and enrichment of the wild animal enclosures constituted (50%), Feeding (20%), Health care facilities availability (20%), stocking of different wild animals and a mate (10%).

3. 3. Tourist impact on the Chimpanzee behavioural Pattern in Makurdi Zoological Garden

The contingency table for test of the effect of tourist on behavioural pattern of Chimpanzee is presented in Table 4 to 7; it indicates, the χ^2 value of 5.47, df = 1 and p-value = 0.019 (Statistically significant) for Locomotive behavioural pattern (Table 4). The behavioural pattern associated with entertainment by the Chimpanzee indicated, $\chi^2 = 0.5$, df = 1, with p-value = 0.480 (Statistically significant) (Table 5).

The Cochran-Mantel-Haenszel (M^2) test showed that; $M^2 = 8.210$, df = 3 and p-value = 0.042 (Statistically significant) for behavioural pattern related to the Chimpanzee relaxation (Table 6). The relieve behavioural pattern exhibited by the Chimpanzee reveals $M^2 = 0.394$, df = 2 and p-value = 0.821 (Not statistically significant), which indicates that, the relieved behaviour observed were independent of non-contact and contact by the tourists with the Chimpanzee.

Table 4. Locomotive Response of Chimpanzee with respect to tourists contact and noncontact in Makurdi Zoological Garden.

Tourist	Time	Locomotion	
		Pacing	Walking
Noncontact	Morning	11	2
	Evening	7	8
Contact	Morning	3	1
	Evening	0	3

Mantel-Haenszel χ^2 = 5.4727, df = 1, p-value = 0.0193

Table 5. Entertaining activity of Chimpanzee with respect to tourists in Makurdi Zoological Garden.

Tourist	Time	Entertainment	
		Play	Display
Noncontact	Morning	4	0
	Evening	1	0
Contact	Morning	1	7
	Evening	0	4

Mantel-Haenszel χ^2 = 0.5, df = 1, p-value = 0.4795

Table 6. Relaxation activity of Chimpanzee with respect to tourists in Makurdi Zoological Garden

Tourist	Time	Relaxation			
		Resting	Sleeping	Standing	Sitting
Noncontact	Morning	23	4	19	26
	Evening	21	3	36	33
Contact	Morning	0	0	4	4
	Evening	0	0	5	4

Cochran-Mantel-Haenszel M^2 = 8.2099, df = 3, p-value = 0.0419

Table 7. Relieved activity of Chimpanzee with respect to tourists
in Makurdi Zoological Garden.

Tourist	Time	Relieve		
		Grooming	Self-scratching	Aggression
Noncontact	Morning	5	6	0
	Evening	4	6	0
Contact	Morning	0	0	1
	Evening	1	0	2

Cochran-Mantel-Haenszel $M^2 = 0.39394$, df = 2, p-value = 0.8212

4. DISCUSSION

The Chimpanzee activity rated based on focal scan interaction with the tourists was on its solitary behaviours. The Chimpanzee behavioural pattern exhibited was based on activities with the Chimpanzee. At the contact level; Aggression (Agonism) and Display forms the major behavioural activity. This behavioural result is at variance with [12], who found non-contact Aggression occurring often in captive western low land Gorillas. Chimpanzee activity budget was similar to Gorilla behaviour in that it spent more time to rest [2]. On multiple occasions Chimpanzee displays and stands in observation moving round the cage in responses to stimuli caused by tourists. Sitting and standing was observed more often by the Chimpanzee during non-contact with tourists, this could be due to was loneliness and bored of the animal in the cage.

The overall tourist inflow was generally sighted not to be in mixed groups, as only males and females were accounted during their visitation. This pattern points a signal that majority of the tourists that visit the zoological garden were not in groups of familial patterns. This differs with the findings of [1] in the same zoological garden. The age bracket of the tourists indicated a vibrant and curious learning stage among the tourists. This reflects on the educational level of the tourists, as majorities were able to read and write. Students were found to be the major tourist and this signified them as first timers. This corroborates with the findings of [2] in University of Ibadan, zoological garden, Nigeria. Most tourists were at the zoological garden for relaxation, social outings and education/research purpose, while others are for seeking knowledge on the life cycle event (learn about the captive animals and ecology). This conforms with to findings of [6, 9]) in the same zoological garden.

Tourist that interacted with the Chimpanzee found it entertaining though rated the zoological garden low as a result of dilapidated facilities and the zoo animals' enclosure and enrichment especially that of Chimpanzee enclosure. Habitually, captive facilities are required to promote species-typical behavior and physiological well-being of primate animal [6]. Also, [13], ascertain the need for proper Chimpanzee housing enrichment. The probability to revisit the zoo by most of the tourists was low due to the underlying factors, such as; inadequate diversity of fauna species, poor cage enrichment, inadequate infrastructure for relaxation,

damaged facilities and poor management of the wild animal enclosure. Convectional zoos are attractive and command tourist participation if well managed. This provide enable environment for proper zoo management, which enhance education, social events and life cycle events embracing high motivational factors that encourage tourists to revisit a zoo-based center. This serves as management tools towards proper stocking/enrichment carried out alongside with other relevant zoo facilities promote the image and therapy the deteriorating state of the Zoo. Tourists' participation has a broad implication on behavioural pattern of captive animals. It varies across taxonomic group and play important role in ethology studies. The impact was more on the locomotive response of the Chimpanzee. Entertainment/ relaxation were observed to be normal at tourist contact level. This was true for social animals like primates. Chimpanzee tends to withdraw at any threat posed by the tourists. It was recommended that animal welfare at varying situation should be considered.

5. CONCLUSION AND RECOMMENDATION

This study provides insight onto the behavioural response of captive Chimpanzee to tourists in Makurdi zoological garden. The behavioural responses of the zoo-housed Chimpanzee with the visitors were satisfactory. Therefore, visitor`s interaction with the chimpanzee in Makurdi Zoological Garden provided a satisfactory ground for continuous patronage of the zoo and enlightenment on Chimpanzees' conservation status and welfare. Facilities in the Zoo should be restructured and demand for increased number of wild animals in the Zoo need to be emphasized to encourage continuous participation and satisfaction.

It is recommended that management strategies toward conservation and rehabilitation of the garden should be intensified. Prompt action should be taken in providing environmental/ enclosure enrichment for the zoo animals.

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