Nigerian Journal of Wildlife Management

Nig. J. of Wildl. Mgt., 2018, 2(1): 23-36 

https://wildlifesocietyng.org/ojs/index.php/wildlifesocietyng-journal/index

# Emergency Preparedness, Health and Safety Measures in Some Institutional-Based Zoological Gardens in Nigeria

***Omonona, A. O., Adetuga, A. T. and Ajayi, O. O.**

Department of Wildlife and Ecotourism Management,
University of Ibadan, Ibadan, Nigeria.

*Email: ao.omonona@gmail.com

## Abstract

The study assessed emergency preparedness, health and safety measures in relation to zoo staff, visitors and animals in selected institutional-based zoological gardens in Nigeria. Data were collected through key informant interviews with the zoo directors and administration of semi-structured questionnaires to visitors and staff who were selected using purposive and convenience sampling techniques. All the zoos except FUTA Park had dart guns while none of the zoos had an emergency planning department. Most zoos did not have a general health and safety policy; only FUNAAB and UI Zoos made use of signages to pass across safety information to visitors. Most zoo staff consented to the fact that there are risks of contracting zoonotic diseases while working in the zoo. There is need for the zoological gardens to have a health and safety unit that will be responsible for policies to ensure health and safety within the zoos.

**Keywords**: Emergency preparedness, health and safety measures, zoological gardens, Nigeria

## Introduction

Zoological gardens (zoos) are places where various wild animals and possibly strange domestic animals are kept and systematically displayed in enclosures for the purpose of public viewing. They are described as educationally planned oriented life animal displays, presented to the visitor in the most aesthetically pleasing, interesting and naturalistic context (Omonona and Ayodele, 2011) and have long been considered as one of the hubs for the conservation of wild animals as well as centers for public recreation and education (Cuaron, 2005). Zoological gardens have been proven to be scenic sites capable of attracting large numbers of visitors for longer periods of time (Akosim & Irokanulo, 2008). Wild animals in the zoological gardens have to be kept securely not only for the staff's safety (and health) but also for the people visiting the zoological gardens.

Health and safety-related issues are becoming subjects of global concern due to their knowledge and sensitivity to their existence. Zoological gardens, are often vulnerable to both visitor- and employee-related risks. A wide variety of health and safety risks are often encountered by zoo employees including animal bites, animal escape, back injuries, infections, adverse exposure to anaesthetic gases and sometimes mortalities in certain cases (Kabuusu, Keku, Kiyini & McCann, 2010). For instance, incidences of lion attack on a zoo keeper at Agodi zoo (Ayodele, 2017), lion escape at Jos Wildlife Park (Akintayo, 2015) and other cases have been well documented. Specifically, the exposure to zoonotic diseases is primarily one of the most important of these health and safety risks for

zoo employees due to the nature of their job that requires close contact with the wild animals (Chethan-Kumar, 2013) and sometimes for zoo visitors depending on their route of transmission. The common modes of disease transmission may include a direct mode (*viz.*, direct skin contact, inhalation, ingestion, animal bites, and needle stick injuries) and indirect mode (*viz.*, fomite, vector-borne and air-borne transmission). As such, the health and safety of zoo animals, employees and visitors to zoos is very important and should be treated with utmost priority. This will ensure and guarantee repeated visits (by visitors) and comfortability while working (by zoo employees). There are very few or no documented studies on health and safety measures in zoological gardens in Nigeria. This study therefore assessed emergency preparedness, health and safety measures in selected institutional-based zoological gardens in Nigeria.

## Materials and Methods

### *Study Areas*

The study was conducted in four (4) institutional-based zoological gardens in Nigeria namely: University of Ibadan Zoological Garden, Ibadan, Oyo State (UI Zoo), Federal University of Technology Zoological Garden, Akure, Ondo State (FUTA Park), Federal University of Agriculture Zoological Garden, Abeokuta, Ogun State (FUNAAB Zoo) and University of Ilorin Zoological Garden, Ilorin, Kwara State (UNILORIN ZOO). The UI Zoo which lies on latitude 7.4454°N and longitude 3.3986°E came into existence over six decades ago as a menagerie to support teaching and research in the Department of Zoology. The mean total rainfall was 1420.06mm with a mean maximum temperature of 26.46°C and the relative humidity was 74.55%. The FUTA Zoo, also known as Prof. Afolayan Wildlife Park, lies on longitude 05° 18' E and latitude 07° 17'N and covers a land area of about 8.91 hectares. It is a lowland rainforest and the general topography of the area is gently undulating and the area is well drained with most of the run-off draining into the stream which passes through the area. Some rock outcrops are also found in the area. FUNAAB Zoo lies on latitude 7.2309°N and longitude 3.4382°E. It has an elevation of 66 m (217ft) and was established in 2012 and occupies 62 hectares of land. The zoo was established for education/research and recreational purposes and also serves the general public as leisure garden to appreciate nature and see different animals in their natural habitat. It is situated on the east of the bank of the Ogun River in a wooded savannah. The University of Ilorin Zoo which lies on latitude 8.4807°N and longitude 4.5257°E was established in 1985 to complement the University's biological sciences' departments in teaching and research. The zoo is located on a vast area of land in the Guinea Savannah vegetation belt south of the Sahara.

### Data Collection and Analysis

Participants in this study were visitors and staff of the selected zoological gardens. Purposive (18 years and above) and convenience (based on their willingness to participate in the study) sampling techniques were used in the selection of respondents who were visitors to and staffers of the selected zoological gardens. A total of 44 Staff and 412 visitors [determined by using Krejcie and Morgan (1970) method for determination of sample size (Table I)] between February and May, 2018 were sampled. Data were collected through direct field observations, administration of questionnaires and key informant interviews. Two types of semi-structured questionnaires were designed and administered to the respondents (visitors and zoo staff) to obtain basic socio-demographic information; information on perception of visitors and zoo staff on health and safety measures in the zoos; and emergency preparedness procedures put in place by the selected zoological gardens in case of any eventuality. Staff perception of health and safety practices in the zoo was measured on a 3-point Likert scale type of Agree, Disagree and Indifferent, and the scores obtained were categorized as 1 - 1.4, 1.5 - 2.4 and 2.5 - 3.0 signifying agreement, disagreement and indifference respectively. Visitors' perception of the health and safety measures was assessed on a 5-point Likert scale of Strongly Agree, Agree, Indifferent, Disagree and Strongly Disagree, where scores

of 1 - 1.7, 1.8 - 3.4 and 3.5 - 5.0 signified agreement, indifference and disagreement, respectively. Similarly, visitors' perception of the zoos' emergency preparedness was scored on a 3 point Likert scale of 'Yes', 'No' and 'I don't know', where scores of 1 - 1.4, 1.5 - 2.4 and 2.5 - 3.0 signified Yes, No and I don't know respectively.

Direct observations were made to confirm the integrity and enrichment of animal cages; availability of health and safety measures (including facilities) that are in place; emergency preparedness equipment; operational veterinary facility and staff strength. Four key informant interviews (KII) were also conducted to elicit additional information from each zoo director or coordinator on health and safety, and emergency preparedness procedures (and policies) being put in place by the zoos. Data collected were subjected to descriptive (frequencies, percentage, mean, standard deviation and tables) statistics. Data were analysed using the Statistical Package for Social Sciences (SPSS) version 20.

Table 1: Sample Size for the study

| Zoological Garden | Visitors | Staff |
|---|---|---|
| UI Zoo | 151 | 23 |
| FUNAAB Zoo | 17 | 9 |
| UNILORIN Zoo | 185 | 3 |
| FUTA Park | 59 | 3 |
| Total | 412 | 44 |

## Results

### *Socio-demographic characteristics of respondents (staff and visitors)*

The socio-demographic information of zoo staff are presented in Table 2. Majority (77.3%) of the respondents across the zoos were males. The dominant age group of the respondents was 34 - 41 years at 43.2%. On their level of education, all the respondents in FUNAAB Zoo and 66.7% in FUTA Park possessed tertiary education, while majority in UI Zoo (68.2%) and UNILORIN Zoo (77.8%) possessed secondary education. Most zoo staff (77.3%) across the zoos were of the Christian faith. In addition, majority of the zoo staff across the zoos (72.7%) were married. Table 3 also presents the socio-demographic information of zoo visitors. The result revealed that most visitors to FUTA Park and UNILORIN Zoo were males with 64.4% and 53.5% respectively while the majority of visitors to FUNAAB Zoo and UI Zoo were females with 70.6% and 51.7% respectively. A large number of the respondents were within the age groups 18-25 (46.6%) and 26-33 (30.7%) while most of them (83.1%) possessed tertiary education. Also, a larger percentage (61.6%) of the visitors practiced Christianity while 37.7% and 0.7% practiced Islam and Traditional religion respectively. Information obtained from visitors on their marital status revealed that more than half (60.1%) of the visitors were single followed by 38.2% that were married. Furthermore, majority of the visitors (99.5%) were Nigerians while 0.5% were Foreigners.

Table 2: Socio-demographic characteristics of staff

| | | UNILORIN ZOO | | FUTA PARK | | FUNAAB ZOO | | UI ZOO | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | % | F | % | F | % | F | % | F | % |
| Gender | Male | 8 | 88.9 | 3 | 100.0 | 7 | 77.8 | 16 | 69.6 | 34 | 77.3 |
| | Female | 1 | 11.1 | 0 | 0 | 2 | 22.2 | 7 | 30.4 | 10 | 22.7 |
| Age (years) | 18 – 25 | 0 | 0 | 0 | 0 | 3 | 33.3 | 0 | 0 | 3 | 6.8 |
| | 26 – 33 | 0 | 0 | 0 | 0 | 2 | 22.2 | 2 | 8.7 | 4 | 9.1 |
| | 34 – 41 | 3 | 33.3 | 1 | 33.3 | 2 | 22.2 | 13 | 56.5 | 19 | 43.2 |
| | 42 – 49 | 3 | 33.3 | 2 | 66.7 | 2 | 22.2 | 6 | 26.1 | 13 | 29.5 |
| | 50 – 58 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 4.3 | 1 | 2.3 |
| | >58 | 3 | 33.3 | 0 | 0 | 0 | 0 | 1 | 4.3 | 4 | 9.1 |
| Education | None | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Primary | 1 | 11.1 | 1 | 33.3 | 0 | 0 | 2 | 9.1 | 4 | 9.3 |
| | Secondary | 7 | 77.8 | 0 | 0 | 0 | 0 | 15 | 68.2 | 22 | 51.2 |
| | Tertiary | 1 | 11.1 | 2 | 66.7 | 9 | 100.0 | 5 | 22.7 | 17 | 39.5 |
| Religion | Islam | 5 | 55.6 | 0 | 0 | 3 | 33.3 | 2 | 8.7 | 10 | 22.7 |
| | Christianity | 4 | 44.4 | 3 | 100.0 | 6 | 66.7 | 21 | 91.3 | 34 | 77.3 |
| | Traditional | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Marital status | Single | 0 | 0 | 1 | 33.3 | 4 | 44.4 | 7 | 30.4 | 12 | 27.3 |
| | Married | 9 | 100.0 | 2 | 66.7 | 5 | 55.6 | 16 | 69.6 | 32 | 72.7 |

Table 3: Visitors socio-demographic characteristics

| | | UNILORIN ZOO | | FUTA PARK | | FUNAAB ZOO | | UI ZOO | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | F | % | F | % | F | % | F | % | F | % |
| Gender | Male | 99 | 53.5 | 38 | 64.4 | 5 | 29.4 | 73 | 48.3 | 215 | 52.8 |
| | Female | 81 | 43.8 | 21 | 35.6 | 12 | 70.6 | 78 | 51.7 | 192 | 47.2 |
| Age (years) | 18 – 25 | 82 | 44.3 | 34 | 57.6 | 6 | 35.3 | 69 | 45.7 | 191 | 46.6 |
| | 26 – 33 | 52 | 28.1 | 19 | 32.2 | 5 | 29.4 | 50 | 33.1 | 126 | 30.7 |
| | 34 – 41 | 18 | 9.7 | 4 | 6.8 | 5 | 29.4 | 20 | 13.2 | 47 | 11.5 |
| | 42 – 49 | 24 | 13.0 | 1 | 1.7 | 1 | 5.9 | 6 | 4.0 | 32 | 7.8 |
| | 50 – 58 | 7 | 3.8 | 1 | 1.7 | - | - | 4 | 2.6 | 11 | 2.7 |
| | >58 | 1 | 0.5 | - | - | - | - | 1 | 0.7 | 5 | 0.7 |
| Education | None | - | - | - | - | - | - | - | - | - | - |
| | Primary | - | - | 1 | 1.7 | 1 | 5.9 | 4 | 2.7 | 6 | 1.5 |
| | Secondary | 35 | 18.9 | 8 | 13.6 | 1 | 5.9 | 17 | 11.6 | 61 | 15.4 |
| | Tertiary | 141 | 76.2 | 49 | 83.1 | 15 | 88.2 | 125 | 85.6 | 330 | 83.1 |
| Religion | Islam | 74 | 40.0 | 19 | 32.2 | 10 | 58.8 | 52 | 34.4 | 155 | 37.7 |
| | Christianity | 107 | 57.8 | 40 | 67.8 | 7 | 41.2 | 99 | 65.6 | 253 | 61.6 |
| | Traditional | 3 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.7 |
| Marital status | Single | 76 | 41.1 | 50 | 84.7 | 9 | 52.9 | 112 | 74.7 | 247 | 60.1 |
| | Married | 103 | 55.7 | 9 | 15.3 | 8 | 47.1 | 37 | 24.7 | 157 | 38.2 |
| | Divorced | 2 | 1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 |
| | Widowed | 3 | 1.6 | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0.7 |
| | Separated | 1 | 0.5 | 0 | 0 | 0 | 0 | 1 | 0.7 | 2 | 0.5 |
| Nationality | Nigerian | 181 | 97.8 | 59 | 100.0 | 17 | 100.0 | 151 | 100.0 | 408 | 99.5 |
| | Non-Nigerian | 2 | 1.1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0.5 |

**Health, Safety and Emergency Preparedness Measures and Facilities in the Zoos**

The various health, safety and emergency preparedness measures and facilities in the zoos are presented in Table 4. All the zoos except FUNAAB Zoo did not have a general health and safety policy. None of the zoos had health and safety enforcement officers. Monitoring of employees' health was done only in FUNAAB Zoo while regular disinfection of animal enclosures was done in all the zoos except UNILORIN Zoo. Across the zoos, animal enclosures were designed to accommodate the strength and ferociousness of animals. Routine inspection of zoo by the fire service department of the University was done only in FUNAAB Zoo. All the zoos except FUTA Park had first aid kits while only UI Zoo had anti-snake venom. There were veterinary facilities in FUNAAB Zoo and UI Zoo while all the zoos had quarantine facilities for new and/or sick animals. Two of the four zoos – FUNAAB Zoo and UI Zoo made use of signages to pass across safety tips to visitors while only UI Zoo possessed CCTV surveillance cameras for monitoring of various activities in the zoo. Across the zoos, communication of information in the zoo among staff is done through the use of mobile phones. On emergency preparedness facilities and measures, all the Zoos except FUTA Park had dart guns. In addition, only UI Zoo had alarm systems, fire detection and suppression equipment and fire extinguishers. None of the zoos had an emergency planning department.

Table 4: Health, safety and emergency preparedness measures and facilities in the zoos

| | UNILORIN ZOO | FUTA PARK | FUNAAB ZOO | UI ZOO |
|---|---|---|---|---|
| General health and safety policy | - | - | + | - |
| Health and safety enforcement officers | - | - | - | - |
| Wearing of protective clothing by zoo staff | + | + | + | + |
| Monitoring of employees' health | - | - | + | - |
| Regular disinfection of animal enclosures | - | + | + | + |
| Design of enclosures to accommodate strength and ferociousness of animals | + | + | + | + |
| Daily cleaning of animal enclosures | + | + | + | + |
| Routine inspection of zoo by University Fire Service | - | - | + | - |
| Health and safety equipment/facility | | | | |
| First aid kits | + | - | + | + |
| Anti-snake venom | - | - | - | + |
| Veterinary facility | - | - | + | + |
| Facilities for hand washing at strategic points in the zoo | - | - | + | - |
| Quarantine for new and/or sick animals | + | + | + | + |
| Security measures in place | | | | |
| Locking of animal enclosures | + | + | + | + |
| Use of signages | - | - | + | + |
| Verbal caution of visitors | - | - | + | + |
| CCTV surveillance cameras | - | - | - | + |
| Communication gadgets | | | | |
| Mobile phone | + | + | + | + |
| Whistle | + | - | - | - |
| Walkie-talkie | - | - | + | + |
| Emergency preparedness | | | | |
| Dart guns | + | - | + | + |
| Alarm systems | - | - | - | + |
| Fire detection and suppression equipment | - | - | - | + |
| Fire extinguishers | - | - | - | + |
| Escape routes aside main entry/exit points | + | + | + | + |
| Emergency planning department | - | - | - | - |
| Safes areas/emergency meeting points | - | - | + | + |

+ = available; - = not available

**Perception of Zoo Staff about Health and Safety Practices in the Zoos**

As shown in Table 5 below, across the zoos, most staff agreed with the statements 'I eat only in designated places within the zoo' and 'I feel safe working in the zoo'. This is reflected in low mean scores of 1.07 ± 0.26 and 1.09 ± 0.29, respectively. They largely disagreed with the statements 'I sometimes eat food meant for animals' and 'There is no risk of contracting zoonotic diseases while working' at mean scores of 1.96 ± 0.37 and 1.93 ± 0.40, respectively. In FUNAAB Zoo, the statements with the highest percentage agreement as reflected in low mean scores were 'I wash my hand before and after entering animal enclosures' and 'I eat only in designated places within the zoo' at 1.00 ± 0.00 each, the highest mean score was with the statements 'I am often exposed to harmful substances in the zoo' and 'The working practices and conditions in the zoo are very poor' at 1.89 ± 0.60 and 1.89 ± 0.78, respectively. In FUTA Park, the statements with the highest percentage agreement as reflected in low mean scores were 'I treat cuts and abrasions sustained while working in the zoo before leaving the premises' and 'I have undergone some trainings on health, safety and emergency preparedness' at 1.33 ± 0.58 each. The highest mean score was with the statements 'I am not involved in any activity beyond my capacity' and 'I wash my hand before and after entering animal enclosures' at 2.00 ± 0.00 and 2.00 ± 1.00, respectively. In UNILORIN Zoo, the statement with the highest percentage agreement as reflected in low mean scores were 'I feel safe working in the zoo' at 1.00 ± 0.00, the highest mean score was with the statement 'There is no risk of contracting zoonotic diseases while working' at 2.11 ± 0.13. Likewise, in UI Zoo, the statement with the highest percentage agreement as reflected in low mean scores were 'I feel safe working in the zoo' at 1.04 ± 0.21, the highest mean score was with the statement 'The working practices and conditions in the zoo are very poor' at 2.22 ± 0.85.

**Visitors' Perception of the Health and Safety Measures of the Zoos**

Most respondents across the zoos displayed high percentage agreement (reflected in low mean score) with the statement: 'the animal enclosures are constructed to keep the animals in (1.45 ± 0.62) as shown on Table 6. The highest mean rank was with the statement 'The signages communicate the information concisely' (2.72 ± 1.25). For individual zoos, the following were reported: the statements with the lowest mean ranks were 'The animal enclosures are such that the animals can escape' (1.24 ± 1.03), 'The animal enclosures are constructed to keep the animals in' (1.54 ± 0.93), 'The health and safety measures of the zoo are adequate' (1.30 ± 0.46), and 'I feel safe in the zoo environment (1.71 ± 0.75) in FUNAAB Zoo, FUTA Park, UNILORIN Zoo and UI Zoo respectively. Unilaterally, in each zoo, visitors disagreed with the statement 'The animal enclosures are such that the animals can escape' at 4.24 ± 1.03, 3.94 ± 1.02, 3.66 ± 1.01 and 3.78 ± 1.20 in FUNAAB Zoo, FUTA Park, UNILORIN Zoo and UI Zoo respectively.

.

Table V: Staff Perception of Health and Safety Practices in the Zoos

| Perception | FUNAAB ZOO | | FUTA PARK | | UNILORIN ZOO | | UI ZOO | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| I feel safe working in the zoo | 1.13 | 0.35 | 1.67 | 0.58 | 1.00 | 0.00 | 1.04 | 0.21 | 1.09 | 0.29 |
| I am not involved in any activity beyond my capacity | 1.56 | 0.73 | 2.00 | 0.00 | 1.11 | 0.33 | 1.09 | 0.42 | 1.25 | 0.53 |
| There is no risk of contracting zoonotic diseases while working | 1.56 | 0.53 | 1.67 | 0.58 | 2.11 | 0.31 | 2.04 | 0.21 | 1.93 | 0.40 |
| I am often exposed to harmful substances in the zoo | 1.89 | 0.60 | 1.00 | 0.00 | 1.50 | 0.54 | 1.09 | 0.42 | 1.33 | 0.57 |
| The working practices and conditions in the zoo are very poor | 1.89 | 0.78 | 1.67 | 0.58 | 1.22 | 0.44 | 2.22 | 0.85 | 1.91 | 0.83 |
| I treat cuts and abrasions sustained while working in the zoo before leaving the premises | 1.78 | 0.83 | 1.33 | 0.58 | 1.78 | 0.44 | 2.13 | 0.55 | 1.93 | 0.63 |
| I wash my hand before and after entering animal enclosures | 1.00 | 0.00 | 2.00 | 1.00 | 1.33 | 0.50 | 1.22 | 0.42 | 1.25 | 0.49 |
| I eat only in designated places within the zoo | 1.00 | 0.00 | 1.00 | 0.00 | 1.11 | 0.33 | 1.09 | 0.29 | 1.07 | 0.26 |
| I sometimes eat food meant for animals | 2.00 | 0.00 | 1.67 | 0.58 | 1.89 | 0.33 | 2.00 | 0.43 | 1.96 | 0.37 |
| I have undergone some trainings on health, safety and emergency preparedness | 1.56 | 0.53 | 1.33 | 0.58 | 1.67 | 0.50 | 2.04 | 0.37 | 1.81 | 0.50 |

**Note:** SD – Standard deviation

Table 6: Visitors' perception of the health and safety measures of the zoos

| Perception | FUNAAB ZOO | | FUTA PARK | | UNILORIN ZOO | | UI ZOO | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| The health and safety measures of the zoo are adequate | 1.59 | 0.62 | 1.93 | 0.97 | 1.30 | 0.46 | 1.89 | 0.85 | 1.62 | 0.77 |
| I feel safe in the zoo environment | 1.65 | 0.79 | 1.83 | 0.70 | 1.56 | 0.51 | 1.71 | 0.75 | 1.66 | 0.65 |
| The warning signages are strategically located | 1.81 | 0.83 | 2.55 | 1.21 | 3.39 | 0.87 | 1.89 | 0.92 | 2.66 | 1.17 |
| The signages communicate the information concisely | 1.60 | 0.63 | 2.40 | 1.07 | 3.54 | 1.01 | 1.91 | 0.95 | 2.72 | 1.25 |
| The animal enclosures are constructed to keep the animals in | 1.50 | 0.52 | 1.54 | 0.63 | 1.29 | 0.50 | 1.61 | 0.71 | 1.45 | 0.62 |
| The animal enclosures are made of strong and durable materials | 1.47 | 0.62 | 1.78 | 0.90 | 1.71 | 0.56 | 1.90 | 0.87 | 1.78 | 0.75 |
| The animal enclosures are such that the animals can escape | 4.24 | 1.03 | 3.94 | 1.02 | 3.66 | 1.01 | 3.78 | 1.20 | 3.77 | 1.09 |
| Animal enclosures are kept clean and safe | 1.77 | 0.90 | 2.22 | 0.94 | 1.33 | 0.60 | 2.45 | 1.21 | 1.89 | 1.06 |
| The rest rooms/conveniences are clean and safe | 2.41 | 0.71 | 2.95 | 1.25 | 1.63 | 0.58 | 2.52 | 1.00 | 2.17 | 1.00 |
| The eating areas are safely located away from animal enclosures | 2.18 | 1.13 | 2.10 | 1.11 | 1.77 | 0.51 | 2.25 | 1.02 | 2.01 | 0.88 |
| The design of the zoo perimeter is adequate | 1.65 | 0.49 | 2.25 | 0.86 | 1.60 | 0.55 | 1.85 | 0.74 | 1.79 | 0.71 |

**Note:** SD – Standard deviation

**Visitors' Perception of the Emergency Preparedness Measures of the Zoos**

Table 7 reveals the perception of visitors on the health and safety measures and emergency preparedness across the zoos. Across the zoos, the statements which ranked lowest and highest and by implication high and low percentage agreements respectively were: 'The zoo environment is very clean as expected' (1.17 ± 0.44) and 'There are CCTV surveillance cameras at strategic places in the zoo' (2.40 ± 0.61). In FUNAAB Zoo, visitors largely agreed with the statement 'The disallowance of feeding of animals by visitors is for their safety' as reflected on a low mean score of 1.29 ± 0.59 and disagreed with 'There are CCTV surveillance cameras at strategic places in the zoo' (2.38 ± 0.50). The lowest mean rank statements in FUTA Park is 'The zoo environment is very clean as expected' (1.29 ± 0.59), while the statements 'There are CCTV surveillance cameras at strategic places in the zoo' and 'I have seen fire extinguishers at strategic places in the zoo' had the highest mean rank of 2.15 ± 0.41 each. In UNILORIN Zoo, the statements with the lowest and highest mean ranks were 'The entry/exit points are strategically located' and 'There are CCTV surveillance cameras at strategic places in the zoo' at 1.02 ± 0.16 and 2.61 ± 0.49 respectively. In UI Zoo, the statements with the lowest and highest mean ranks were 'The zoo environment is very clean as expected' and 'There are CCTV surveillance cameras at strategic places in the zoo' at 1.23 ± 0.48 and 2.23 ± 0.72 respectively.

Table 7: Visitors' perception of the health, safety and emergency preparedness measures of the zoos

| Perception | FUNAAB ZOO | | FUTA PARK | | UNILORIN ZOO | | UI ZOO | | TOTAL | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Mean | SD | Mean | SD | Mean | SD |
| The zoo environment is very clean as expected | 1.35 | 0.70 | 1.29 | 0.59 | 1.07 | 0.25 | 1.23 | 0.48 | 1.17 | 0.44 |
| I can contract diseases in the zoo | 2.06 | 0.43 | 1.86 | 0.51 | 2.05 | 0.61 | 1.93 | 0.57 | 1.98 | 0.58 |
| The disallowance of feeding of animals by visitors is for their safety | 1.29 | 0.59 | 1.46 | 0.80 | 1.04 | 0.24 | 1.41 | 0.72 | 1.24 | 0.59 |
| The disallowance is for the safety of animals | 1.33 | 0.72 | 1.63 | 0.82 | 1.15 | 0.51 | 1.42 | 0.68 | 1.32 | 0.65 |
| I am exposed to harmful substances or situations within the zoo | 1.88 | 0.34 | 1.93 | 0.49 | 2.33 | 0.53 | 2.01 | 0.49 | 2.14 | 0.53 |
| The entry/exit points are strategically located | 1.25 | 0.58 | 1.43 | 0.70 | 1.02 | 0.16 | 1.29 | 0.64 | 1.19 | 0.52 |
| There are CCTV surveillance cameras at strategic places in the zoo | 2.38 | 0.50 | 2.15 | 0.41 | 2.61 | 0.49 | 2.23 | 0.72 | 2.40 | 0.61 |
| I wear extra protective clothing when coming to the zoo | 2.00 | 0.00 | 1.86 | 0.44 | 2.10 | 0.36 | 1.93 | 0.33 | 2.00 | 0.37 |
| I have seen fire extinguishers at strategic places in the zoo | 1.94 | 0.57 | 2.15 | 0.41 | 2.15 | 0.55 | 2.04 | 0.62 | 2.10 | 0.56 |
| I sustained an injury while on my visit to the zoo | 2.00 | 0.00 | 1.98 | 0.13 | 1.99 | 0.10 | 1.97 | 0.18 | 1.98 | 0.14 |

## Discussion

The need to evaluate emergency preparedness, health and safety measures in zoological gardens is crucial in order to ensure and guarantee the well-being of both zoo employees and visitors not excluding animal welfare. The socio-demographic characteristics of respondents showed that a large number of the respondents across the zoos were males. Adetola, Adewumi and Olonimoyo (2016) also reported higher male respondents in their study while Arul, Tamilenthi and Srividhya (2013) averred that males may be more eager to travel for visits than females. A higher percentage of our respondents practiced Christianity as corroborated by Adetola *et al.* (2016). A good number of the respondents were singles. Arowosafe and Adebayo (2014) reported that single individuals often have more freedom and less financial outlay on travelling for tourism. On the health, safety and emergency preparedness measures and facilities being put in place in the zoological gardens, most of the zoos did not have a general written health and safety policy and none of the zoos had health and safety enforcement officers. This ought to be treated or addressed as an urgent issue because laid down health and safety policies ensures adequate welfare and security in zoos for staff, visitors and animals as well.

Similarly, based on the excerpts from the key informant interview, all the zoos were not licensed by any government agency. Ogbonna and Nwaogazie (2015) maintained that the Nigerian federal laws regulate safety practices of organizations in the country but most times the effects of these laws and policies are not felt mainly because the laws are poorly enforced. Monitoring of employees' health was done only in FUNAAB Zoo while regular disinfection of animal enclosures was done in all the zoos except UNILORIN Zoo. Zoo staff should be regularly screened for the presence of disease pathogens and the affected personnel treated accordingly (CZA, 2009) so as to forestall disease transmission. Animal enclosures across the zoos were designed to accommodate the strength, ferociousness (of some animals like the lions, hyenas and so on) and prevent too much close contact with the animals. From direct field observation, it was observed that some of the materials used in constructing the primates' enclosures are already giving way which could facilitate animal escape though majority of the visitors felt safe in the zoos due to proper restraint of animals in most zoos. Proper physical restraint of wild animals in the zoos is important to evade fear, apprehension and bites (Chethan-Kumar, 2013). Scheftel *et al.* (2010) averred that physical barriers often lessen the chances of exposure of human skin and mucus membranes to infective materials and accidental injuries. Cage enrichment was also discovered to have been fairly provided for the animals to simulate what is obtainable in their natural habitats and also reduce boredom-induced stress that could impact on their health. On the safety of animals, through key informant interview, we found out that natural disasters like flooding (in UNILORIN Zoo), falling of trees on animals' enclosures (in UI Zoo) and fire outbreak (in FUNAAB Zoo and FUTA Park) have been experienced. The zoo management reported measures to forestall these disasters to include regular trimming of tree branches (including felling of old trees), creation of standard stream channels to curb flooding and procurement of fire extinguishers in case of fire outbreak (though this was only sighted at UI Zoo). On disease outbreak, only UNILORIN Zoo reported outbreak of tuberculosis that affected tortoise and baboons but was curtailed. Just two of the four zoos (FUNAAB Zoo and UI Zoo) make use of signages to pass across safety information to visitors. Chethan-Kumar (2013) opined that even though majority of zoo visitors may not be aware of proper health and safety measures (including diseases that are transmitted from wild animals to humans), it is necessary for zoo authorities and management to engage in public education through displaying signage boards and leaflets distribution. Zoos also need to create an in-house safety committee or unit which will inspect various areas and facilities in the zoo on a regular basis.

Only UI Zoo possessed CCTV surveillance cameras for monitoring of various activities in the zoo whose functionality was however subject to the availability of electricity. The acquisition and proper use of functioning technologically-aided equipment (monitoring devices) help to ensure constant and adequate surveillance of various activities in the zoo.

Similarly, emergency preparedness requires a good communication plan and equipment. Communication of information in the zoos among staff is being done through the use of mobile phones. Clear lines of communication are very important, two-way radios or mobile phones are to be available to the staff, enabling them to take quick action in case of any danger or emergency. Central public address systems (managed from the control room) are also important in disseminating information to broader range of audience in case of any eventuality. On emergency preparedness facilities and measures, all the Zoos except FUTA Park had dart guns, only UI Zoo had alarm systems, fire detection and suppression equipment and fire extinguishers while none of the zoos had an emergency planning department. Routine inspection of zoo by the fire service department of the University was done only in FUNAAB Zoo. Human factors such as carelessness, negligence and lack of fire safety awareness are some of the leading causes of fire outbreaks. Asodike and Abraham (2011) opined that lack of acquisition of fire extinguishers and organized periodic safety trainings account for incidences of outbreaks like fire. All the zoos except FUTA Park had first aid kits while only UI Zoo had regular storage of anti-snake venom. Both visitors and staff are vulnerable to small accidents including animal bites, or falls. At least one qualified staff member should always be on site to provide first aid in case of any emergency. A comprehensive emergency preparedness plan will provide the basis for a planned response that will ensure that zoo staff reacts to an emergency situation in a manner that will ensure the safety and well-being of zoo employees, zoo staff, captive wildlife, facilities and properties, and surrounding environment.

On the perception of zoo staff as regards health and safety practices in their respective zoos, majority of the respondents asserted that they feel safe working in the zoo though most also consented to the fact that there are risks of contracting zoonotic diseases while working in the zoos. Perlino, Hilliard and Koehler (1998) avowed that negligence of zoo employees toward the use of personal protective equipment during cleaning of animal enclosures and improper hygiene may increase the chances of infection. In fact, mandatory use of personal protective equipment (like gloves, mask, face shield, apron) during cleaning of animal enclosures or discharge of other duties should be strictly enforced (Chethan-Kumar, 2013). Even though most respondents in FUTA Park and UI Zoo admitted that they have undergone some training on health, safety and emergency preparedness, those in UNILORIN and FUNAAB Zoos consented otherwise. In lieu of this, the management of zoos need to develop risk management plan that will require constant revision, training and ideas from zoo employees while accommodating remarkable suggestions from visitors. On the perception of zoo visitors with respect to their health and safety while on visitation to the zoos, most respondents felt safe within the zoo environment and opined the adequacy of health and safety measures of the zoos. Most zoo visitors also agreed that the disallowance of feeding of animals by visitors is for their safety and that of the animals. Johnson *et al.* (2005) demonstrated that human contact with animals within zoo could pose a risk of zoonotic disease introduction and dissemination within human and animal populations.

## Conclusion

Zoological gardens may be exposed daily to a variety of health and safety risks that can impact the ecosystem stability. This risk may include animal escapes, natural disasters, theft, and property destruction and so on. In order to manage these risks, the zoo management have to develop policies, measures, procedures and safety guidelines that will protect employees, visitors, animals and facilities. Administrative commitment to health and safety measures can be reinforced by having the right people, procedures and systems in place. Every zoological garden with an operational license must have a risk management programme which though may vary in some degree, will have a common goal of ensuring health and safety of both staff and visitors to the zoos. There is also need for the zoological gardens to have or create a health and safety unit that will be responsible for policies, planned responses and measures to ensure good health, safety and well-being of both zoo staff and visitors.

## Acknowledgments

The authors are grateful to the management of the four zoological gardens used in this study for granting the approval to conduct the study and also appreciate the critical evaluations of the anonymous reviewers.

**Conflict of Interest**

The authors have not declared any conflict of interest.

## References

Adetola, B. O., Adewumi, I. B. & Olonimoyo, H.T. (2016). Tourist satisfaction with attractions of Idanre Hills, Ondo State, Nigeria. *American Journal of Tourism Management*, 5(1): 1-8

Akintayo, E. (2016). *Lion escape at Jos Wildlife Park,https://www.vanguardngr.com/2015/12/lion-escapes-from-Jos-wild-life-park-shot-dead/*

Akosim, C. & Irokanulo, U. O. (2008). *Applies Zoo management for student in tertiary Institutions and conservationists*. 1st ed. paraclete publishers, Yola 1-79.

Arowosafe, F. C. & Adebayo, A. E. (2014). Investigating Indicators for Tourist Satisfaction at Mole National Park, Ghana. *American Journal of Tourism Management*, 3(1A): 1-6

Arul, P., Tamilenthi, S. & Srividhya, C. (2013). A Study on Tourism Potential Socio – Economic Characteristics of the Tourists Problems and Planning for Future Development - A case study of Thiruvarur District. *African Journal of Geo-Science Research*, 1(2): 16-23

Asodike, J. D. & Abraham, N. M. (2011). An investigative analysis of the safety practices in private nursery schools in Port Harcourt metropolis. *African J. Soc. Sci*. 1(3): 118-130.

Ayodele, A. (2017). *Lion kills zookeeper in Ibadan, https://www.punchng.com/lion-kills-zookeeper-in-ibadan/*

Centarl Zoo Authority (CZA) (2009). Zoos in India-legislation, policy, guidelines and strategies, pp. 1-1033

Chethan-Kumar, H. B., Lokesha, K. M., Madhavaprasad, C. B., Shilpa, V. T., Karabasanavar, N. S. & Kumar, A. (2013). Occupational zoonoses in zoo and wildlife veterinarians in India: A review. *Veterinary World*, 6(9): 605-613

Cuaron, A. D. (2005). Further role of zoos in conservation: Monitoring wildlife use and the dilemma of receiving donated and confiscated animals. *Zoo Biology*, 24: 115-124

Johnson, Y. J., Nadler, Y., Field, E., Myint, M. S., O'Hara-Ruiz, M. S., Ruman, A., Olson, S., Herrmann, J. A., Briscoe, J., Hickey, M. & Kunkle, J. (2014). Flu at the Zoo: Emergency Management Training for the nation's Zoos and Aquariums. *Homeland Security and Emergency Management,* 11(3): 415 – 435

Kabuusu, R. M., Keku, E. O., Kiyini, R. & McCann, T. J. (2010). Prevalence and patterns of self-reported animal-related injury among veterinarians in metropolitan Kampala. *Journal of Veterinary Science,* 11(4): 363-365

Ogbonna, C. I. & Nwaogazie, I. L. (2015). Fire safety preparedness in workplaces in Port Harcourt, Nigeria. *International Research Journal of Public and Environmental Health,* 2 (8), 112-121

Omonona, A. O. & Ayodele, I. A (2011). Principles of Zoo Management in Nigeria, Ibadan. University Press.

Perlino, C., Hilliard, J. & Koehler, J. (1998). Fatal Cercopithecine herpesvirus 1 (B Virus) infection following a mucocutaneous exposure and interim recommendations for worker protection. *Morb Mort Wkly Rep,* 47 (49): 1073-1083

Scheftel, J. M., Elchos, B. L., Cherry, B., DeBess, E. E., Hopkins, S. G., Levine, J. F., Williams, C. J., Bell, M. R., Dvorak, G. D., Funk, R. H., Just, S. D., Samples, O. M., Schaefer, E. C. & Silvia, C. A. (2010). Compendium of

veterinary standard precautions for zoonotic disease prevention in veterinary personnel: National Association of State Public Health Veterinarians, veterinary infection control committee. *J Am Vet Med Assoc,* 237(12): 1403-1422