# PROFILE OF WILDLIFE ANIMALS MEAT (BUSH MEAT) CONSUMERS IN SOUTHWEST, NIGERIA

[1]Akinsorotan, O.A., [2]Idris-Adeniyi, K.M. and [1]Alabi, O.V.

[1]Department of Wildlife and Ecotourism Management
Osun State University, Nigeria
oluseun.akinsorotan@uniosun.edu.ng
olayinkavictoria0@gmail.com

[2]Department of Agricultural Extension and Rural Development
Osun State University, Nigeria
kaothar.idris-adeniyi@uniosun.edu.ng

**Corresponding author:** Idris-Adeniyi, K.M.
kaothar.idris-adeniyi@uniosun.edu.ng
+234(0) 803 8693 029

## ABSTRACT

*Bushmeat constitutes a significant proportion of human dietary animal protein intake. This study profiled bush meat consumers in Southwest, Nigeria. Specifically, the study described the socio-economic characteristics of respondents; examined respondents' knowledge and attitude to wildlife and established the pattern of bushmeat consumption among respondents. Using simple random and snow-ball sampling techniques, two hundred (200) respondents were selected as study sample. Relevant data were collected using questionnaires, and were analysed using descriptive and inferential statistics. Results showed that 59.5% of the respondents were males with mean age of 41.0±18.9years, most (85.0%) of whom attained tertiary education and were urban residents (69.5%). Some (26.0%) were government officials and professionals (35.0%) with an average monthly income of ₦200,746.52± ₦41,808.50. Most (86.0%) of the sampled respondents knew that earthworms maintain soil fertility and that tigers and leopards are types of cat (80.5%) while 58.5% believed that wild animals meat should always be served on special occasions and that wild animals should not be protected at the expense of people making economic livelihood, off the land (57.5%). Results further revealed that in the last one year, 20.5% of the sampled respondents consumed bushmeat once, and twice (20.0%), mostly at the restaurants. Respondents had considerable knowledge of wildlife but cared less about its conservation. Hence, conservation education is imperative in the study area.*

**Keywords:** Wildlife, bush meat consumers, sustainable environment, conservation education.

## INTRODUCTION

Globally, wildlife serves as source of nutrition, medicine and is of spiritual values in many human cultures in tropical and subtropical areas (Ichikawa, Hattori & Yasuoka, 2017). Wild animal meat (hereafter bushmeat) serves as an essential source of animal protein, macro nutrients and fat for forest dwelling people (Golden, Fernald, Brashares, Rasolofoniana & Kremen, 2011;

Mendoca, Vasconcellos, Souto, Oliveira & Alves, 2016). Bushmeat includes all terrestrial wild animals, some amphibious or semi aquatic freshwater animals from snails, crocodile to elephants (Oduntan, Soaga, Shotuyo, Akintunde & Olanrewaju, 2016). Bushmeat has been reported as the safety net for rural dwellers as it reduced household expenditure and the likelihood of consuming purchased meat/fish (Schulte-Herbrüggen, Cowlishaw, Homewood & Rowcliffe, 2013). Consumption of bushmeat can be driven by various factors ranging from low cost, preference of taste, or perception of prestige (Nasi, Taber & Van Vliet, 2011; Ordaz-Nemeth *et al.,* 2017). Moreover, increase in human population influences the demand for bushmeat and other non-timber forest product in Africa (Nyaki, Gray, Lepczyk, Skibins & Rentsch, 2014). For instance, the population of Economic Community of West African States (ECOWAS) has been projected to double by 2050 (Sylla, 2017). Most of this population growth will occur due to rapid urbanization and migration (Allen & Heinrigs, 2018). Since 1950, West Africa has continuously experienced explosive urban growth and at present 43% of its population lives in the cities (Allen & Heinrigs, 2018). Population growth propels the demand for food which may have unprecedented environmental damage including overexploitation of targeted wild animals and the destruction of their habitat (Lucas *et al*. 2020). Despite the availability of choices for different types of animal protein in the urban centers, bushmeat has been noted as an important source of protein and special delicacy for the inhabitants (Brashares, Golden, Weinbaum, Barrett & Okello, 2011; van Vliet & Mbazza, 2011). Hence, the high demand for bushmeat by the urban population (van Vliet & Mbazza, 2011; Luiselli *et al.,* 2020). The increasing demand for bushmeat has led to unsustainable extraction of large animals. Mostly, those with low reproduction rate are targeted by the hunters (Luiselli *et al*., 2020). Regardless of their declining population, wild animals are continuously targeted and hunted to the point of extirpation in many forested areas (Nasi *et al.,* 2011). These unsustainable hunting practices have led to the defaunation of most forests, leaving them to be devoid of wild animals and hence "empty forests". Unsustainable extraction of wild animals has ecological implications to the wildlife population and ecosystem function and structure (Abernethy, Coad, Taylor, Lee & Maisels, 2013). For instance, past researchers have found significant difference in tree seedlings as protected areas have more trees than forest sites with reported cases of bushmeat hunting in Cross River, Nigeria (Effiom, Nunez-Iturri, Smith, Ottosson & Olsson, 2013). Generally, most people consume wild animals because they are not aware of the influence of their consumption attitude on wild population. Social acceptance in terms of motivation, satisfaction, norms and attitude towards bushmeat is on the increase. In order to meet the demand for bushmeat, wild animals are unsustainably harvested from their natural habitats. Despite the conservation interventions, hunting of animals has perpetually increased in the protected areas. Therefore, it is imperative to examine the profile of consumers of bushmeat in the urban centres as they constitute larger proportion of human population, while bushmeat demand from such areas will be a major threat to wildlife conservation. To this end, this paper described the socioeconomic characteristics of bush meat consumers examined their knowledge and attitude to wildlife conservation and established the pattern of bush meat consumption among respondents.

**MATERIALS AND METHOD**

This study was conducted in Southwestern, Nigeria. During the design of this study, 3 states (Osun, Ondo and Ogun) were randomly selected. However, two states (Oyo and Osun) were conveniently sampled for the study. This is due to the imposed movement restriction occasioned by the COVID-19 lockdown in 2020 coinciding with the period of data collection. Hence, study sample were drawn mainly from the two states' capitals. The two states have an equatorial climate with dry and wet seasons and relatively high humidity. The wet season starts from April and ends in October while the dry season lasts from November to March.
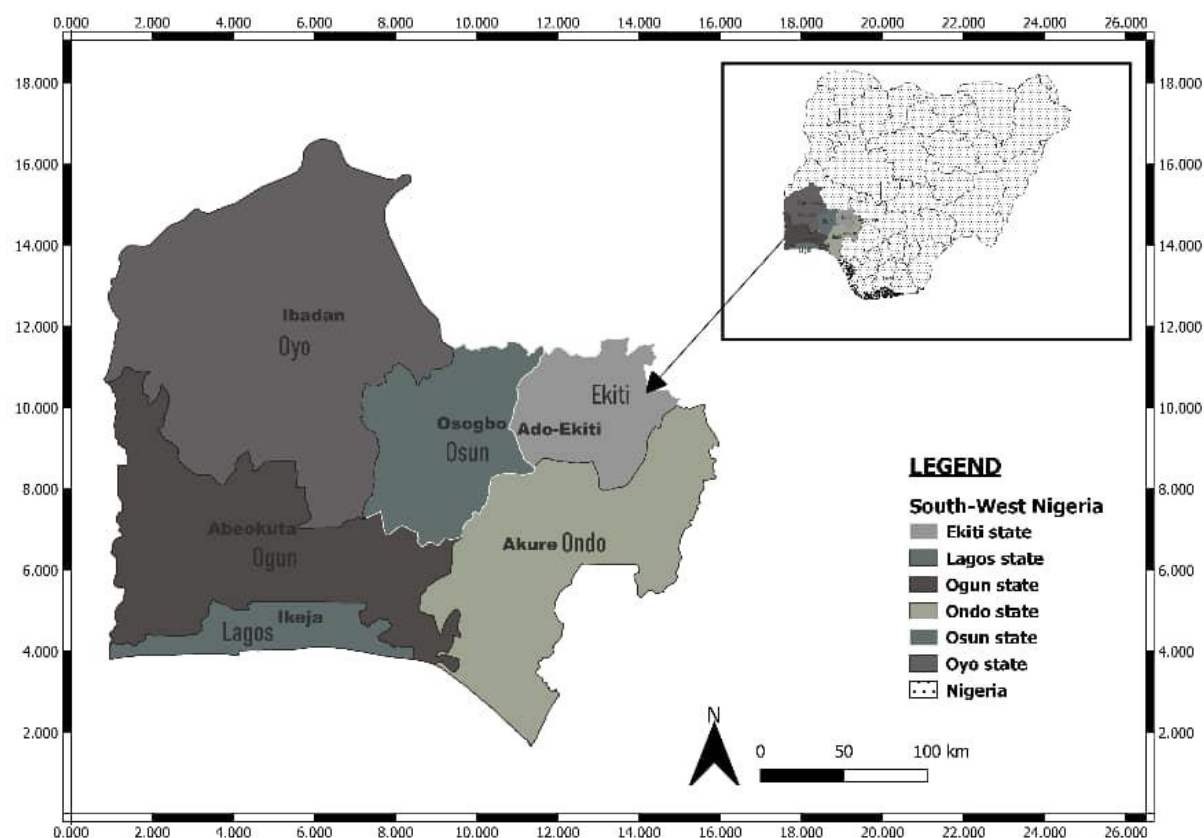


**Figure 1:** Map showing the States in South-west Nigeria and their capitals

A three-stage sampling procedure was used to select sample for the study. Stage one involved random selection of 2 (Osun and Oyo states) of the 6 Southwestern states. Stage two involved purposive sampling of major restaurants (Osun=2 and Oyo=3) where bush meat is served, ministries (Osun=4 and Oyo=4) and hospitals (one in each state, n=2). At the third and final stage, a total of two hundred (200) respondents were randomly selected based on some pre-determined characteristics including gender, age and status. Respondents' distribution is as follows: (restaurants = 97; ministries = 54 and hospitals = 38). Primary data were collected using semi structured questionnaires designed to obtain information on the respondents'

socioeconomic characteristics, knowledge and attitude to wildlife conservation and bushmeat consumption pattern. Questionnaires were self-administered across the two selected states by the three members of the research team. Each respondent spent about 15minutes to 30 minutes in filling the questionnaire. The questionnaire used by Drury (2009) was adapted for this study. Coded data were analyzed using Statistical Package for Social Science version 23 to conduct descriptive statistics (Frequency counts, percentages, means, standard deviation & ranking) and inferential statistics (Cross Tabulation Analysis).

## RESULTS AND DISCUSSION
### Socioeconomic characteristics of bush meat consumers in the study area

Table I shows the results of the socioeconomic characteristics of bush meat consumers in the study area. More than half (59.5%) of the respondents were males. This was predetermined as men are believed to eat mostly in the restaurant especially while having lunch at work and they also like to consume bush meat. The majority (63.5%) of the respondents were above 30 years of age. This implies that most of the respondents were in their active ages and as such could take decisions that would be of great advantage to their lives including what to consume and not to consume. A higher proportion (70.5%) of the respondents indicated their birth place as an urban centre. Living in an urban area is expected to influence an individual's negative attitude and behaviour to wildlife conservation. Overall, 85% of the respondents had tertiary education, implying that most of the respondents were adequately educated. Less than half (35.0%) of the respondents were professionals in their fields of study showing that they have the opportunity to secure well paid job and earn enough money hence high purchasing power to support bush meat consumption. Most (85.5%) of the respondents earn more than ₦99,000.00 as their monthly income. This suggests that the respondents can afford to consume bush meat, despite its relatively high price compared to other meats.

**Table I: Socio-economic Characteristics Respondents**

| VARIABLES | FREQUENCY | PERCENTAGE | Mean ± SD |
|---|---|---|---|
| **Gender** | | | |
| Male | 119 | 59.5 | |
| Female | 81 | 41.5 | |
| **Age Group** | | | **40.5±27.3years** |
| 21-30 years | 73 | 36.5 | |
| 31-40 years | 45 | 22.5 | |
| 41-50 years | 66 | 33.0 | |
| 51-60 years | 13 | 6.5 | |
| 61 years and above | 3 | 1.5 | |
| **Age group/sex** | | | |
| Male | | | **42.3±21.8 years** |
| Female | | | **38.8±18.5 years** |
| **Description of Birthplace** | | | |
| Urban | 139 | 69.5 | |
| Rural | 57 | 28.5 | |
| **Level of Education** | | | |
| No formal education | 4 | 2.0 | |
| Primary | 2 | 1.0 | |
| Secondary | 23 | 11.5 | |
| Tertiary | 155 | 77.5 | |
| Masters/Ph.D | 16 | 8.0 | |
| **Occupation** | | | |
| Civil service | 78 | 39.0 | |
| Security agencies | 6 | 3.0 | |
| Professionals | 70 | 35.0 | |
| Skilled labourer | 14 | 7.0 | |
| Teaching | 5 | 2.5 | |
| Unemployed | 3 | 1.5 | |
| Student | 22 | 11.0 | |
| Retiree | 1 | 0.5 | |
| Others (trading) | 1 | 0.5 | |
| **Monthly income** | | | **N200,746.52±41,808.50** |
| Less than N50,000.00 | 29 | 14.5 | |
| N50,000.00 – N99,000.00 | 42 | 21.5 | |
| N100,000.00 – N149,000.00 | 58 | 29.0 | |
| Above N150,000.00 | 70 | 35.0 | |

**Source:** Field survey; 2020.

**Knowledge of Wildlife**
Table II shows the frequency of the responses on all the 10 statements from which we gathered information on respondents' knowledge of wildlife. The data were transformed and knowledge scores were generated. The result reveals that most (89.5%) of the respondents have knowledge of wild animals (see Figure II). This implies that the respondents had a vast knowledge about wild animals. Information on people's knowledge about wildlife can influence their attitude and behaviour towards wildlife conservation programs and the environment (Kuriyan, 2002; White, Eberstein & Scott, 2018). Past researchers have reported a positive attitude to wildlife among the students and staffs of primary school after creating awareness and providing environmental knowledge (species identification) in East Sussex, United Kingdom. Furthermore, understanding and acknowledging residents' knowledge and perception of wildlife conservation is an important part of a process of engaging with local communities and building constructive relationships between residents and protected area management (Allendorf, Aung & Songer, 2012).

**Table II: Respondents' Knowledge of Wildlife**

| Statements | True | | False | | Don't know | |
|---|---|---|---|---|---|---|
| | **Freq.** | **(%)** | **Freq.** | **(%)** | **Freq.** | **(%)** |
| A shark is a mammal | 90 | (45.0) | 95 | (47.5) | 15 | (7.5) |
| Lizard have backbone | 146 | (73.0) | 36 | (18.0) | 18 | (9.0) |
| All the following animals are venomous: scorpion, gecko, snakes | 124 | (62.0) | 46 | (23.0) | 20 | (10.0) |
| Earthworms are important in maintaining soil fertility | 172 | (86.0) | 17 | (8.5) | 11 | (5.5) |
| Elephants eat small mammals such as mice | 51 | (25.5) | 117 | (58.5) | 26 | (13.0) |
| Mammals lay eggs | 65 | (32.5) | 120 | (60.0) | 15 | (7.5) |
| Pangolins mainly eats ants and termites | 91 | (45.5) | 21 | (10.5) | 88 | (44.0) |
| Rhinos lay eggs | 61 | (30.5) | 93 | (46.5) | 46 | (23.0) |
| Some turtles can live longer than humans | 158 | (79.0) | 21 | (10.5) | 21 | (10.5) |
| Tigers and leopards are types of cats | 161 | (80.5) | 32 | (16.0) | 7 | (3.5) |

**Source:** Field survey; 2020.

**Knowledge of Wildlife**
Table II shows the frequency of the responses on all the 10 statements from which we gathered information on respondents' knowledge of wildlife. The data were transformed and knowledge scores were generated. The result reveals that most (89.5%) of the respondents have knowledge of wild animals (see Figure II). This implies that the respondents had a vast knowledge about wild animals. Information on people's knowledge about wildlife can influence their attitude and behaviour towards wildlife conservation programs and the environment (Kuriyan, 2002; White, Eberstein & Scott, 2018). Past researchers have reported a positive attitude to wildlife among the students and staffs of primary school after creating awareness and providing environmental knowledge (species identification) in East Sussex, United Kingdom. Furthermore, understanding and acknowledging residents' knowledge and perception of wildlife conservation is an important part of a process of engaging with local communities and building constructive relationships between residents and protected area management (Allendorf, Aung & Songer, 2012).

**Table II: Respondents' Knowledge of Wildlife**

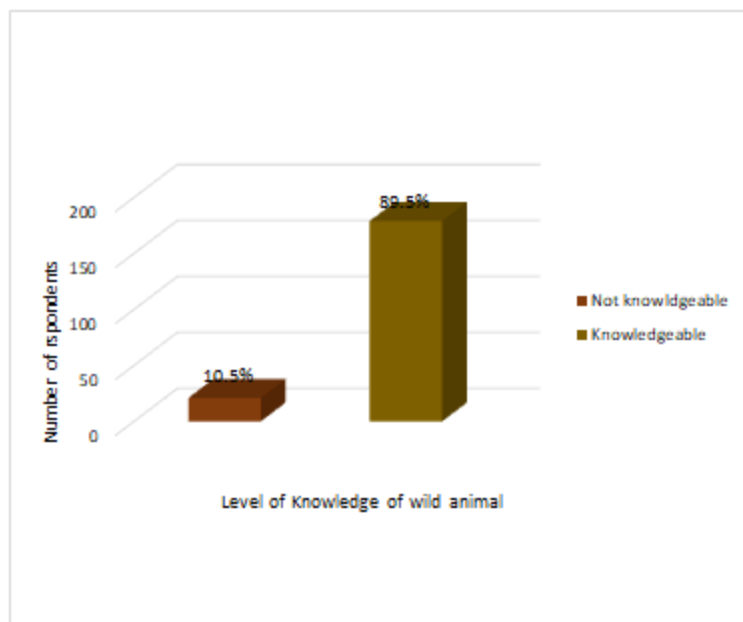| Statements | True | | False | | Don't know | |
|---|---|---|---|---|---|---|
| | **Freq.** | **(%)** | **Freq.** | **(%)** | **Freq.** | **(%)** |
| A shark is a mammal | 90 | (45.0) | 95 | (47.5) | 15 | (7.5) |
| Lizard have backbone | 146 | (73.0) | 36 | (18.0) | 18 | (9.0) |
| All the following animals are venomous: scorpion, gecko, snakes | 124 | (62.0) | 46 | (23.0) | 20 | (10.0) |
| Earthworms are important in maintaining soil fertility | 172 | (86.0) | 17 | (8.5) | 11 | (5.5) |
| Elephants eat small mammals such as mice | 51 | (25.5) | 117 | (58.5) | 26 | (13.0) |
| Mammals lay eggs | 65 | (32.5) | 120 | (60.0) | 15 | (7.5) |
| Pangolins mainly eats ants and termites | 91 | (45.5) | 21 | (10.5) | 88 | (44.0) |
| Rhinos lay eggs | 61 | (30.5) | 93 | (46.5) | 46 | (23.0) |
| Some turtles can live longer than humans | 158 | (79.0) | 21 | (10.5) | 21 | (10.5) |
| Tigers and leopards are types of cats | 161 | (80.5) | 32 | (16.0) | 7 | (3.5) |

**Source:** Field survey; 2020.

**Figure II: Level of Respondents' Knowledge of Wild Animals**

## Attitudes towards Wildlife Conservation

Regarding attitude towards wildlife conservation, generally, findings from this study show that respondents have somewhat favourable attitude to wildlife conservation. (See Figure III). However, weighted mean scores (WMS) were calculated for the tested attitudinal statements for ranking them (see Table III) in their order of importance to wildlife conservation. Of the 12 attitudinal statements measured, the respondents disagree to the statement "Conserving wild animals is a waste of time and resources". The statement has the highest weighted mean score (WMS) of 3.73 and was ranked (R) 1st. This result reveals that respondents' level of education and their place of residence might have probably influenced their attitude towards wildlife conservation. Despite respondents' favourable attitude to some statements, they were of the opinion that various species of wild animals should be served in the restaurants (WMS= 3.12 & R= 6th); not interested in learning about the ecological characteristics of species (WMS=2.95 & R=7th ); prefer to see wild animals in a zoo rather than seeing them living wild in the forest (WMS=2.80 & R= 8th); felt dams can be built even if it will destroy wild animals habitat (WMS=2.72 & R=9th); forests should be cleared to boost economic growth (WMS=2.67 & R=10th); meat from wild animals such as antelope, grass cutter should be served on special occasions (WMS=2.66 & R=11th) and that animal should not be protected at the expense of the economic livelihood of those whose survival depends on it (WMS= 2.64 & R=12th). These findings suggest that respondents' favourable attitude towards wildlife is not totally formed despite their level of education and knowledge of wildlife. In addition, cultural realities have played out in the statement on consumption of bushmeat. Culturally, the Yorubas have great affinity and preference for bushmeat consumption.

The result of the Chi-square analysis shows that occupation and monthly income are significantly associated with respondents' attitude to wildlife (see Table IV). Similar studies on

drivers of bushmeat consumption in three African countries (Congo, Equatorial Guinea and Gabon) reported that there is an association between wealth and wildlife consumption (Wilkie *et al.,* 2005; Schenck *et al.,* 2006; Fa, Albrechtsen, Johnson & Madonald*,* 2009). This further reiterates that individuals with higher income tends to consume bushmeat.
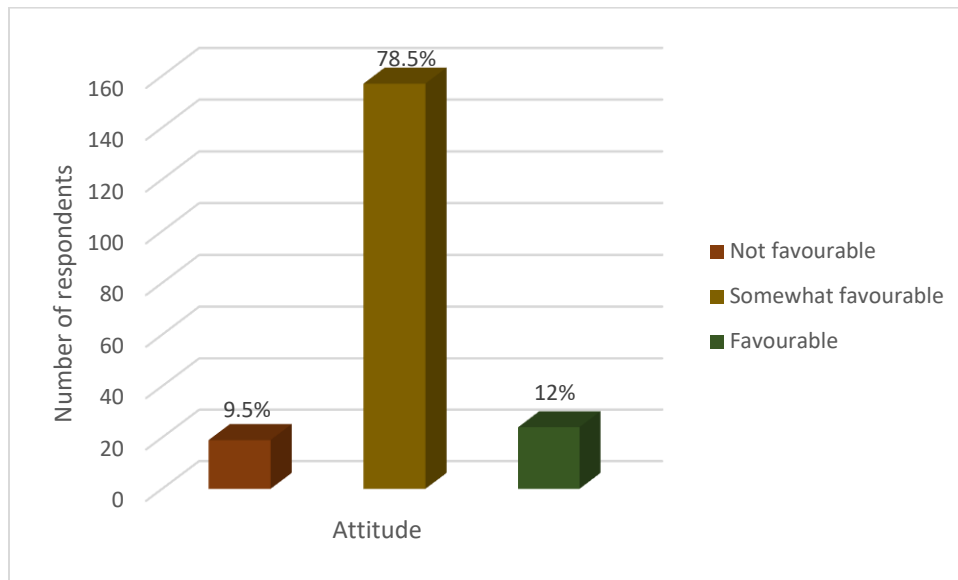


**Figure III: Respondents' Attitude to Wildlife Conservation**

**Table III: Distribution Based on Respondents' Attitude to Wildlife Conservation**

| Attitudinal Statements | SA | A | U | D | SD | WMS | RANK |
|---|---|---|---|---|---|---|---|
| Conserving wild animals is a waste of time and resources | 20 (10) | 18 (9) | 10 (5) | 101 (50.5) | 51 (25.5) | 3.73 | 1st |
| Capturing wild animals strikes me as an exciting and challenging activity | 28 (14) | 20 (10) | 8 (4) | 112 (56) | 32 (16) | 3.50 | 2nd |
| I would like to try the meat from a wild forest species such as a hyena | 18 (9) | 43 (21.5) | 19 (9.5) | 69 (34.5) | 51 (25.5) | 3.46 | 3rd |
| I generally prefer wild animals that have some practical value | 45 (22.5) | 17 (8.5) | 4 (2) | 97 (46.5) | 37 (18.5) | 3.32 | 4th |
| The most important reason for protecting forests is because the animals there may produce bush meat | 25 (12.5) | 41 (20.5) | 16 (8) | 84 (42) | 34 (17) | 3.31 | 5th |
| Restaurant should be permitted to serve any species of wild forest animals | 33 (16.5) | 62 (31) | 12 (6) | 47 (23.5) | 46 (23) | 3.12 | 6th |
| Although I like animals, I am not particularly interested in learning about the ecological characteristics of species | 23 (11.5) | 65 (32.5) | 23 (11.5) | 77 (38.5) | 12 (6) | 2.95 | 7th |
| I would prefer to see wild animals in a zoo rather than seeing them living wild in the forest | 19 (9.5) | 86 (43) | 27 (13.5) | 53 (26.5) | 15 (7.5) | 2.80 | 8th |
| In order to produce more hydro- electricity it is sometimes necessary to build dams which damage the habitat of some wild animals' species | 21 (10.5) | 89 (44.5) | 29 (14.5) | 47 (23.5) | 14 (7) | 2.72 | 9th |
| If more land is needed to maintain or boost economic growth it is sometimes necessary to clear forests or drain wetlands | 28 (14) | 81 (40.5) | 36 (18) | 40 (20) | 15 (7.5) | 2.67 | 10th |
| On special occasions, it is nice to have meat from wild animals such as antelope, grass cutter | 22 (11) | 95 (47.5) | 23 (11.5) | 49 (24.5) | 11 (5.5) | 2.66 | 11th |
| I don't approve of protecting wild animals if it hurts the economic livelihood of people who make a living off the land | 39 (19.5) | 76 (38) | 23 (11.5) | 43 (22.5) | 19 (9.5) | 2.64 | 12th |

**Table IV: Association between the Socio-economic Characteristics and Attitude to Wildlife Conservation.**

| Variables | Chi-Sq value | df | P value. |
|-----------|--------------|-----|----------|
| Age | 14.99 | 8 | 0.06 |
| Place of birth | 1.34 | 6 | 0.74 |
| Level of education | 12.08 | 12 | 0.45 |
| Occupation | 20.53 | 10 | 0.03* |
| Income | 16.43 | 8 | 0.05* |

**Source:** Field survey; 2020. * Significant at P≤0.05

Key: Chi-sq= Chi-Square value; df=degree of freedom.

**Consumption Pattern of Bushmeat**

More than half (59.5%) of the respondents indicated to have consumed bushmeat in the last 12 months (Table V). This result reveals that people in the urban areas consume bushmeat and hence there is demand and market for bushmeat. The rate of consumption of bushmeat in this study is more than 21.6% that was reported in a study conducted in large urban centres in West Africa (Luiselli *et al.,* 2020). The high rate of bushmeat consumption will invariably influence the rate of bushmeat hunting as many local hunters will engage more in hunting expenditure and hence drive wildlife species population decline. The findings from this study further reveal that bushmeat is not frequently consumed in the urban homes. Out of the 3 occasions, occasion 1 have the highest mean score of 2.0 (see Table VI). Restaurants remain the main source of bushmeat consumed as indicated by the respondents. This present findings corroborate other past study that reported 80% of bushmeat consumption in Vietnam is sourced for, from the restaurants in urban areas (Nguyen, 2003)

**Table V: Distribution of Consumption Pattern of Bushmeat (12 months recall)**

| Pattern of consumption | Frequency | Percentage |
|------------------------|-----------|------------|
| Not consumed at all | 87 | 40.5 |
| Once | 41 | 20.5 |
| Twice | 40 | 20.0 |
| Three times | 18 | 9.0 |
| Four times | 11 | 5.5 |
| Five times | 03 | 1.5 |

| Total | 200 | 100 |
|-------|-----|-----|

**Source:** Field survey, 2020.

**Table VI:** Sources of Bushmeat Consumed and Frequency of Consumption in the Last 12 Months

| Occasion | Restaurant Freq. (%) | Colleague Freq. (%) | Relative Freq. (%) | Friends Freq. (%) | Personal house Freq. (%) | Mean Score |
|----------|------------|-----------|----------|---------|----------------|------------|
| 1 | 72 (36) | 40 (20) | 52 (26) | 36 (18) | 0 (0) | 2.01 |
| 2 | 110 (55) | 14 (17) | 53 (26.5) | 23 (11.5) | 0 (0) | 1.89 |
| 3 | 121(60.5) | 17 (8.5) | 36 (18) | 26 (13) | 0 (0) | 1.84 |

**Source:** Field survey; 2020.

## CONCLUSION AND RECOMMENDATIONS

In conclusion, the respondents' level of knowledge about wild animals, occupation type, having steady income and living in urban centres does not stop them from consuming bush meat. However, most of them have consumed bushmeat at least on one occasion (mostly in the restaurant). This study established that irrespective of occupation type and monthly income, people who have an affinity to consume bushmeat will surely do so. One can say that culture influence consumption of bushmeat in the Southern part of Nigeria. Based on the findings of the study, the following recommendations were made:

i.    Conservation education should be carried out for various people in different places as a means of teaching them about the importance of wildlife conservation and how to keep a sustainable environment, even while meeting the protein needs of the communities through the consumption of bush meats.

ii.   Also, governmental policies should be put in place to curb the unsustainable hunting and consumption of wild species.

iii.  Domestication of some of the preferred species of wild animal by the consumers should be encouraged as this will lower the threat on the wild populations

## REFERENCES

Abernethy, K. A., Coad, L., Taylor, G., Lee, M. E., & Maisels, F. (2013). Extent and ecological consequences of hunting in Central African rainforests in the twenty-first century. Philosophical Transactions of the Royal Society B: *Biological Sciences*, 368(1625), 20120303.

Allen, T., Heinrigs, P., & Heo, I. (2018). Agriculture, food and jobs in West Africa. https://www.oecd.org/swac/topics/food-system-transformations/handout-agriculture-food-jobs-west-africa.pdf Accessed (October, 2020)

Allendorf, T. D., Aung, M., & Songer, M. (2012). Using residents' perceptions to improve park-people relationships in Chatthin Wildlife Sanctuary, Myanmar. *Journal of environmental management*, 99, 36-43.

Brashares, J. S., Golden, C. D., Weinbaum, K. Z., Barrett, C. B., & Okello, G. V. (2011). Economic and geographic drivers of wildlife consumption in rural Africa. *Proceedings of the National Academy of Sciences*, 108(34), 13931-13936.

Drury, R. (2009). Reducing urban demand for wild animals in Vietnam: examining the potential of wildlife farming as a conservation tool. *Conservation Letters*, 2(6), 263-270.

Effiom, E. O., Nuñez-Iturri, G., Smith, H. G., Ottosson, U., & Olsson, O. (2013). Bushmeat hunting changes regeneration of African rainforests. Proceedings of the Royal Society B: *Biological Sciences*, 280(1759), 20130246.

Fa, J. E., Albrechtsen, L., Johnson, P. J., & Macdonald, D. W. (2009). Linkages between household wealth, bushmeat and other animal protein consumption are not invariant: evidence from Rio Muni, Equatorial Guinea. *Animal Conservation*, 12(6), 599-610.

Golden, C. D., Fernald, L. C., Brashares, J. S., Rasolofoniaina, B. R., & Kremen, C. (2011). Benefits of wildlife consumption to child nutrition in a biodiversity hotspot. *Proceedings of the National Academy of Sciences*, 108(49), 19653-19656.

Ichikawa, M., Hattori, S., & Yasuoka, H. (2017). Bushmeat crisis, forestry reforms and contemporary hunting among Central African forest hunters. In Hunter-gatherers in a changing world. *Springer, Champ.* 59-75

Kuriyan, R. (2002). Linking local perceptions of elephants and conservation: Samburu pastoralists in northern Kenya. *Society &Natural Resources*, 15(10), 949-957.

Lucas, A., Kumakamba, C., Lange, C. E., Obel, E., Miningue, G., Likofata, J., ... & Saylors, K. (2020). Serology and behavioural perspectives on Ebola virus disease among bushmeat vendors in Equateur, Democratic Republic of the Congo, after the 2018 outbreak. *In Open forum infectious diseases*. 7(8), 295.

Luiselli, L, Hema E.M., Segniagbeto G.H., Ouattara V., Eniang E.A., Parfait G.. Akani G.C. (2020). "Bushmeat consumption in large urban centres in West Africa. *Oryx* 54(5), 731-734.

Mendonça, L. E., Vasconcellos, A., Souto, C. M., Oliveira, T. P., & Alves, R. (2016). Bushmeat

consumption and its implications for wildlife conservation in the semi-arid region of Brazil. Regional *Environmental Change*, 16(6), 1649-1657.

Nasi, R., Taber, A., & Van Vliet, N. (2011). Empty forests, empty stomachs? Bushmeat and livelihoods in the Congo and Amazon Basins. *International Forestry Review*, 13(3), 355-368.

Nguyen, S.V. (2003). Wildlife trading in Vietnam: why it flourishes. In Economy and Environment Program for Southeast Asia (EEPSEA). EEPSEA Research reports, Tanglin, Singapore.

Nyaki, A., Gray, S. A., Lepczyk, C. A., Skibins, J. C., & Rentsch, D. (2014). Local-scale dynamics and local drivers of bushmeat trade. *Conservation Biology*, 28(5), 1403-1414.

Oduntan, O., Soaga, J., Shotuyo, A., Akintunde, O., & Olarewaju, T. (2016). Economic Contribution of Wildlife to Bushmeat Markets in Ibadan, Oyo State. *Journal of Agricultural Science and Environment*, 16(1), 116-123.

Ordaz-Németh, I., Arandjelovic, M., Boesch, L., Gatiso, T., Grimes, T., Kuehl, H. S., ... & Junker, J. (2017). The socio-economic drivers of bushmeat consumption during the West African Ebola crisis. *PLoS* neglected tropical diseases, 11(3), e0005450.

Schenck, M., Nsame Effa, E., Starkey, M., Wilkie, D., Abernethy, K., Telfer, P., ... & Treves, A. (2006). Why people eat bushmeat: results from two-choice, taste tests in Gabon, Central Africa. *Human Ecology*, 34(3), 433-445.

Schulte-Herbrüggen, B., Cowlishaw, G., Homewood, K., & Rowcliffe, J. M. (2013). The importance of bushmeat in the livelihoods of West African cash-crop farmers living in a faunally-depleted landscape. *PloS one,* 8(8), e72807.

Sylla, M. (2017). Development and analysis of climatological baseline and climate change scenarios for the Economic Community of West African States. *Technical report*

van Vliet, N., & Mbazza, P. (2011). Recognizing the multiple reasons for bushmeat consumption in urban areas: a necessary step toward the sustainable use of wildlife for food in Central Africa. *Human Dimensions of Wildlife*, 16(1), 45-54.

White, R. L., Eberstein, K., & Scott, D. M. (2018). Birds in the playground: Evaluating the effectiveness of an urban environmental education project in enhancing school children's awareness, knowledge and attitudes towards local wildlife. *PloS one*, 13(3), e0193993.

Wilkie, D. S., Starkey, M., Abernethy, K., Effa, E. N., Telfer, P., & Godoy, R. (2005). Role of prices and wealth in consumer demand for bushmeat in Gabon, Central Africa. *Conservation                        biology*,                        19(1),                        268-274.