



PUBLIC PERCEPTION AND CONSERVATION POTENTIAL OF EBOLA VIRUS DISEASE ON HUNTERS AND BUSH MEAT CONSUMPTION: A CASE STUDY OF YANKARI GAME RESERVE



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Abstract: A research on public perception and conservation potential of Ebola virus disease on hunters and bush meat consumption was conducted in Yankari Game Reserve in north-eastern Nigeria with the aim of assessing how the recent outbreak of the Ebola disease has helped in wildlife conservation. A total of sixty (60) well-structured questionnaire were administered to bush meat seller and hunters and also one questionnaire to the Project manager of Yankari Game Reserve making the total of (61) questionnaire in order to examine the socio-economic effect of the outbreak of the disease on the level of bush meat consumption, to investigate the effect of the outbreak of the disease on wildlife conservation and also to investigate the level of hunting activities before and after the outbreak. The result revealed that before the outbreak of Ebola, 100%, of the respondents were regular bush meat eaters at different period of time ranging from 5 yrs. (23.3%), 10 years (16.7%) 15 years (28.3%) and on daily basis (21.7%), weekly basis (30%) monthly basis 26.7%) and yearly basis (21.7 %) but after the disease outbreak bush meat consumption reduced to 28.3% due to fear of the virus, 95% of the hunters were actively involved in hunting of wild animals but after the outbreak 75% suspended hunting activities. It was also discovered that the population of the wild animals in 2014 compared to 2013 was less than 35%.

Keyword: Perception, conservation potential, Ebola, hunters, bush meat

Introduction

The Ebola virus has been an infectious disease in the continent of Africa since its emergence in Zaire in 1976 (WHO, 1978; Heyman *et al.*, 1980; Baron *et al.*, 1983). However, the recent 2014 outbreak of the disease in West Africa has been described as the worlds' most devastating outbreak in history and the first ever to be witnessed in West Africa (Jalloh, 2014). This epidemic outbreak has made the international communities to be devastated and worried for the fear that the disease can easily spread across several borders (Jaax *et al.*, 1995).

According to Jalloh (2014) and Baron *et al.* (1983), disease outbreak can result in isolation of the countries affected and this may consequently contribute significantly in worsening the socio economic conditions of such nations. Whereas fear of Ebola remains worrisome to the international communities, the good news to conservation biologist is that some animals may be free from the danger of being hunted for bush meat because those animals are reported to be potential carriers of the virus. It has been reported that Ebola, tuberculosis, rabies, influenza, foot and mouth disease, brucellosis are among the diseases that have devastating impact on wildlife population and in case of a sudden outbreak of such diseases may isolate population, the fear of the disease in other non-affected areas tend to reduce the manner with which those animals are killed for bush meat (Baron *et al.*, 1983). It is already an established fact that disease do not discriminate. Zoonotic disease can be transferred between species, from wild animals to humans and also from humans to animals. In a situation where there is an uncontrolled disease epidemic, the entire populations of wildlife can be wiped out within a short period of time. They cause not only significant health problems but also economic problems for humans (Jalloh, 2014). The link between wildlife and human health has so many implications for wildlife management. A common problem in wildlife and human health is the one that relates to the ability to identify

wildlife reservoir hosts of new or reemerging human diseases. The identification of these reservoirs is complex and challenging (Haydon *et al.*, 2002). This study is therefore aimed at evaluating the wildlife conservation potential of the 2014 epidemic outbreak of Ebola virus on wildlife. Poaching activities has played a significant damage to wildlife and their habitat while the setting aside and management of land as protected area is a key factor in ongoing efforts to conserve biological diversity at all levels (Abdullahin *et al.*, 2009). The role of the outbreak of any zoonotic diseases and its conservation potential is worth studying.

The Ebola virus disease has been a highly infectious disease in countries of Africa since its first emergence in 1976 in Zaire (WHO, 1978). After this outbreak and emergence, the virus re-emerged in the middle of 1977 in a hospital in north western Zaire where a nine years old girl died of acute hemorrhagic fever. In the south of Sudan, about 284 cases including 151 deaths were reported between June and November 1976 (WHO, 1979 cited in Jalloh, 2014). Between July and October of 1979, some cases of the Ebola virus disease were reported to re-emerge in this same country and that led to 22 deaths (Barron *et al.*, 1983). Ebola is a viral disease that infects primates and it has a high mortality rate. The disease is endemic to Africa and the Philippines (Kuhn, and Samanta, 2010) however, central Africa has been to be a hotpot for the emerging infections Ebola virus disease (Baron *et al.*, 1983, 2009). Due to the high mortality and the level of pathogenic of the virus, it is becoming an attractive subject of research by scientist in the developed worlds and also in the developing nations (Okware *et al.*, 2002). Ebola virus is suspected to have caused a decline in the population size of some resident great apes in Africa (Catalonian, 1988). However, a number of vaccines have been proposed as an intervention to protect those animals especially when their geographical distribution is known and identified.

Records have shown that the 2014 Ebola outbreak was very devastating affecting some countries likes Guinea, Liberia, Nigeria and Sierra Leona with 50% death rate (Jalloh, 2014). WHO have earliest reported that as of end of august 2014, over 240 health workers have developed the Ebola virus disease in guinea, Liberia, Nigeria and Sierra Leona and a total of 120 and even above have died of the disease. In September 30th, 2014, the center for disease control and prevention (CDC) reported 7, 470 infection cases and 3431 deaths in the countries mentioned above. The recorded cases for the four affected countries in West Africa are as follows: Guinea (1,199 infection cases and 732 deaths), Liberia (3,834 infection cases and 2,069 deaths), and Sierra Leone (2, 437 infection cases and 623 deaths) and Nigeria 2014, WHO 2014, CDC 2014). Though, there was no case of Ebola virus recorded in Northern Nigeria where this research was carried out but the fear of the outbreak kept so many people off the quest for bush meat consumption. This outbreak has resulted in an adverse impact on economic growth, commodity prices and government budget deficits and the countries affected were isolated and this contributed significantly in worsening the socio-economic conditions faced by the nations (Jalloh, 2014). On account of the increasingly devastating effects of the Ebola virus outbreak, mining activities in Sierra Leone has significantly declined resulting in the reversal of projections of 2014 economics growth rate from 11.3% to 7.1%. In guinea and Liberia, the World Bank revised its projections of 2014 economic growth rate from 5.9% and 4.5% to 2.5% and 2.45, respectively. In all these countries fiscal revenue declined amidst the outbreak and then government spending significant increased while trying to contend with the spread of the disease.

Bush meat consumption is higher in countries with large urban population, and the increasing urbanization is likely to place even greater pressure on wild animal populations. The danger is unsustainable off take of wild game will lead to a collapse in wild animals population and widespread in will hunger in the region. The local people have hunted for centuries, for food and barter, but the lay 20 years have seen the emergence of a commercial bush meat market due to rural people being increasingly drown into the cash economy” The impacts of subsistence hunting was previously balanced by the fact of the hunting was done on a rotation basis on alternative tracts of forest areas. However, shift in human population dynamics and socio-economic factors are leading to rising and increasingly unsustainable demands on wild animal’s population (Davies, 2002).

Materials and Methods

Study site

The research was carried out in Yankari game reserve, Bauchi State North Eastern Nigeria. The game reserve is situated in the Southern part of the Sudan Savanna. This vegetation zone is composed of Savanna grassland with patches of woodland. This zone falls within the latitudes 9°50¹N and 10°30¹E that lies in the South-Central area of Bauchi State (Abdullahi, 2011).

The vegetation is mainly composed of combretaceous trees and shrubs with *Afzelia*, *Anogeissus* and *Detarium* as the predominant plant species. The annual rainfall in the game reserve has been reported to be between 900 and 1000 mm. The rainy season is from early May to late September. Temperatures range between 18-38°C throughout the season. During winter, the harmattan wind blows from the Sahara often bringing dusty skies, night

temperature fall as low as 12°C while the hottest period is said to be in March/April with high temperature that can rise even above 40°C in the day (Geerling, 1973). The game reserve is a repository for mammals such as African bush elephant, olive baboon, Patas monkey, Tantalus monkey, lion, African buffalo, Roan antelope, bush buck etc.

Sampling procedure

The questionnaire was administered to the project manager of Yankari game reserve and sixty questionnaires to the bush meat sellers and hunters around the reserve through purposive sampling. Thirty hunters were purposely selected based on their availability on the day of visit. Also thirty bush meat sellers were administered the questionnaires. The data for this research was obtained using both primary and secondary source of information. The questionnaire represent the primary source while the secondary source was obtained by consulting journals, books, report and thesis written by different Authors.

Results and Discussion

The results of public perception and conservation potential of Ebola virus disease on hunters and bush meat consumption in Yankari game reserve was collected and analyzed using simple and descriptive statistics and presented inform of table and bar charts. The results shows that the socio-economic effect of recent Ebola virus disease outbreak on bush meat consumers reveals that before the outbreak of Ebola 100% of the respondents were eating bush meat. This shows that before the Ebola Virus outbreak all the respondents were eating bushmeat because there was no case of Ebola outbreak, the result further revealed that, activities of hunter in the study area shows a tremendous reduction and also demand for bush meat and less pressure on the animals in the study area.

Table 1: Socio-economic characteristics of the respondents

Respondent Characteristics	Variables	Frequency (F)	Percentage (%)
Gender	Male	35	58.3
	Female	25	41.7
	Total	60	100
Age	20-29 years	09	15
	30-39 years	21	35
	40-49 years	13	21.7
	>50 years	17	28.3
	Total	60	100
Marital status	Married	27	45
	Single	16	26.7
	Divorced	08	13.3
	Others	09	15
-	Total	60	100
Educational level	Primary	19	31.7
	Secondary	24	40
	Tertiary	17	28.3
	Others	00	00
	Total	60	100

Table 2: Perception and conservation potential of Ebola virus disease on bush meat consumers

Respondent Characteristics	Variables	Frequency	Percentage
Eating of bush meat before Ebola outbreak	Yes	60	100
	No	00	00
	Total	60	100
Period of time you have eaten bush meat	5 years	14	23.3
	10 years	10	16.7
	15 years	17	28.3
	Others	19	31.7
	Total	60	100
Eating of bush meat after Ebola outbreak	Yes	17	28.3
	No	43	71.7
	Total	60	100
Frequency of eating bush meat before Ebola outbreak	Daily	13	21.7
	Weekly	18	30
	Monthly	16	26.7
	Yearly	13	21.7
	Total	60	100
Do Fear of Ebola causes people not to eat bush meat?	Yes	41	68.3
	No	19	31.7
	Total	60	100
Buying of bush meat after Ebola outbreak	Yes	17	28.3
	No	43	71.7
	Total	60	100
Frequency of consuming bush meat before Ebola outbreak	Very High	24	40
	High	19	31.7
	Low	10	16.7
	Very Low	07	11.7
	Total	60	100
Frequency of consuming bush meat after Ebola outbreak	Very High	00	00
	High	03	05
	Low	40	66.7
	Very Low	17	28.3
	Total	60	100
Reasons why bush meat consumption is low	Case of Ebola Virus	13	21.7
	Fear of Ebola Virus	47	78.3
	Total	60	100
Does Ebola outbreak affect business?	Yes	51	85
	No	09	15
	Total	60	100
Reason if Yes	Bush meat consumption is low	15	25
	Fear of Ebola Virus	45	75
	Total	60	100
Period of income generation	Before Ebola Outbreak	56	93.3
	After Ebola Outbreak	04	6.7
	Total	60	100

After the advent of Ebola virus disease, the consumption of bush meat consumers by the respondents shows that the number of bush meat consumption has reduced to only 28.3% due to fear of the virus. Forty (40%) of the

respondents reported that the consumption of bush meat was very high, 31.7% the high, 16.7% low and 11.7% very low while after the advent of the virus, 66.7% of the respondents reported that consumption rate is low, 23.3% very low and 5% high. This shows that before the Ebola virus disease outbreak there was too much consumption of bush meat in the study area while after the Ebola virus diseases outbreak the bush meat consumption is drop due to the fear of Ebola virus disease, for wild animals Ebola virus will serve as a strategy for conservation. With the recent outbreak of Ebola and pronouncement the number of wildlife has increased tremendously due to fear of Ebola virus by the illegal hunters and no market because the bush meat seller and eaters are not buying therefore it serves as a conservation potential of wildlife. The result obtained shows that before the outbreak of Ebola 95% of the respondents were involved in the hunting of wild animals because no case of Ebola (85%) and bush meat consumption was high while (15%) were involved in hunting wildlife reduced due to the fear of the virus which therefore hinder bush meat selling and reduces the price of the bush meat. This indicates that gotten from the respondent's shows that after the outbreak Ebola virus disease may people stop eaten bush meat and the population of the animals in the study area increase at an alarming rate.

The data sourced from the respondents on public perception and conservation potential of Ebola Virus Disease on hunters and bush meat consumption in Yankari Game Reserve shows that the highest participants are males constituting a total of 58.3% and females were 41.7% while the age range reveals that ages between 30-39 year appears to be the majority consisting 35%, followed by respondent with ages from 50 years and above with 28.3%, ages between 40-49 years gave 21.7% while 15% is between the ages of 20-29 years, of the respondent. For marital status, the data shows that 45% are married, 26.7% are single, 13.3% are said to be divorced. 31.7% attended primary education, 40% secondary education and 28.3% attended tertiary education, respectively.

The result on public perception and conservation potential of Ebola Virus Disease on Bush Meat Consumers reveals that before the outbreak of Ebola, 100% of the respondents were eating bush meats at different period of time ranging from 5years (23.3%), 10 years (16.7%) and 15 years (28.3%) on daily basis (21.7%), weekly basis (30%), monthly basis (26.7%) and yearlybasis (21.7%). After the advent of Ebola Virus Disease the consumption of bush meat by therespondents reduced to only 28.3% due to fear of the virus. Prior to the outbreak of Ebola, 40% of the respondents reported that the consumption rate was very high, 31.7% said it is high, 16.7% low and 11.7% very low while after the advent of the virus, 66.7% of the respondents reported that consumption rate is low, 28.3% very low and 5% high because of the fear (78.3%) and cases (21.7%) of the virus which also affected business and income generation by the bush meat sellers.

Based on respondent i.e. the project manager, there is slight change of the population of the animal in 2014 compared with 2013 after conducting the population analysis of the animals (Fig. 1). He also stated that few animals where sited on the buffer zone of the park, which is for decade. Therefore, to wild animals, pronouncement of Ebola virus in Nigeria help positively by increasing their number, based on the population analysis of 2013 and 2014.

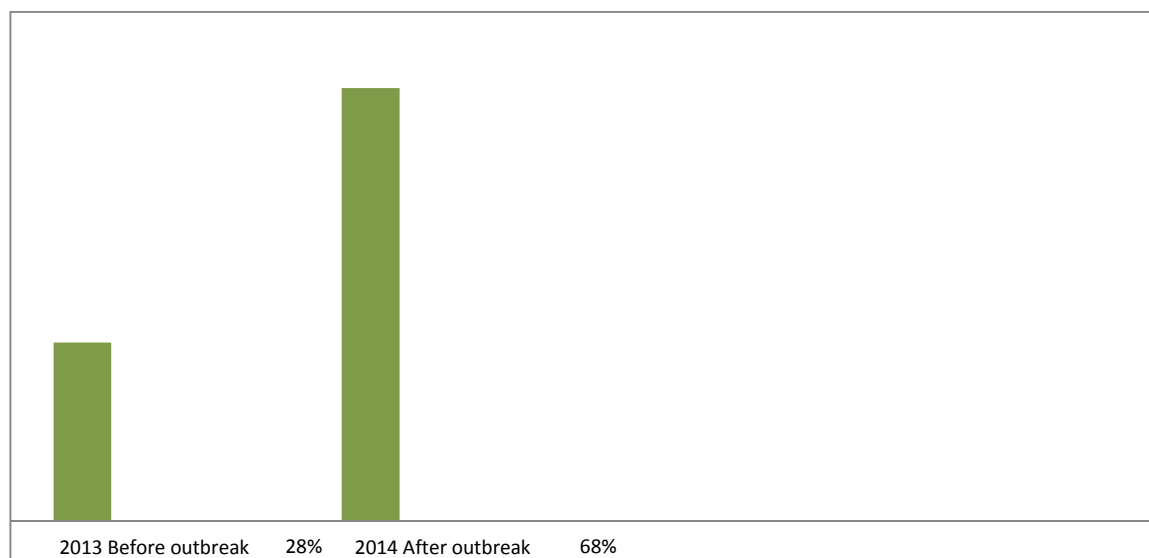


Fig. 1: Effect of recent outbreak of Ebola virus disease on wildlife conservation

The result in Table 3 showed that before the outbreak of Ebola, 90% of the respondents were involved in the hunting of wild animals reason been that there was no case of Ebola virus (80%) and bush meat consumption was high (15%) while 5% were not involved in wild life hunting.

Table 3: Perception on wildlife hunters before and after Ebola virus outbreak

Characteristic Respondents	Variables	Frequency	Percentage
Hunting of wild animal before Ebola outbreak	Yes	57	95
	No	03	05
	Total	60	100
Reasons	No Case of Ebola	51	85
	Bush meat consumption was high	09	15
	Total	60	100
Hunting of bush meat after Ebola outbreak	Yes	16	26.7
	No	44	73.3
	Total	60	100
Reasons	Bush meat consumption was low	14	23.3
	Ebola hinders meat consumption	46	76.7
	Total	60	100
On report of Ebola outbreak	Hindrance from eating bush meat	57	95
	Reduce price of animals	03	05
	Total	60	100

The data gotten shows that after the advent of Ebola, hunting activities reduced due to low-consumption level and the fear of the virus which therefore hinders bush meat selling and reduces the price of the bush meat.

i. Effect of Ebola virus disease outbreak on wildlife conservation

With the recent outbreak of Ebola and pronouncement the number of wildlife has increased tremendously due to fear of Ebola virus by the illegal hunters and no market because the bush meat seller and eaters are not buying therefore it serves as a conservation potential of wildlife.

ii. Perception and conservation potential of Ebola virus disease on wildlife

The result obtained shows that before the outbreak of Ebola 95% of the respondents were involved in the hunting of wild animals because no case of Ebola (85%) and bush meat consumption was high while (15%) were involved in hunting wildlife reduced due to the fear of the virus which therefore hinder bush meat selling and reduces the price of the bush meat. This indicates that gotten from the respondent's shows that after the outbreak Ebola virus disease may people stop eaten bush meat and the population of the animals in the study area increase at an alarming rate.

Conclusion

The study conducted on public perception and conservation potential of Ebola virus disease on hunters and bush meat consumption in Yankari Game reserve of Bauchi state Nigeria. The research focused on the recent Ebola virus disease outbreak on conservation potential of wildlife and hunting activities before and after the outbreak of Ebola. A total of 60 respondents around the enclaves of Yankari game reserve and then one (1) respondent from the Management of Yankari game reserve were sampled, using structure questionnaire. The findings of this study revealed that about 95% of the respondents are aware about Ebola virus disease outbreak. The results also show that majority of the respondents are afraid of Ebola virus disease, the responds indicate that most of the people stop eating bush meat because of the fear of Ebola virus outbreak. The facts obtained shows that Ebola virus disease can serve as a strategy for wildlife conservation in parks and reserves.

The result obtained from the different respondents in the study area shows that before the Ebola virus diseases there was problem of hunting activities in the area and bush

meat consumption in the study area. The result shows that before outbreak of Ebola virus disease 100% were eating bush meat and about 95% were hunting wild animals and the income generation were high. The number of bush meat consumption drop immediately after the pronouncement of Ebola disease from wild animals, most of the respondents shows that hunting activities has reduce due to fear of the virus and hence reduce the income generation of the bush meat sellers.

Therefore, based on the data and information obtained, the pronouncement of Ebola virus disease in Nigeria helped increase the population of wildlife in the study area.

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