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## **Perception and Prevention Practices Against Ebola Virus Disease by Bush Meat Handlers in Ibadan, Nigeria**

**<sup>1</sup>Ayegbusi T., <sup>1</sup>Jegede S.A., <sup>1</sup>Aminu K. and <sup>2\*</sup>Oluwayelu D.O**

<sup>1</sup>*Department of Sociology, Faculty of the Social Sciences, University of Ibadan, Ibadan, Nigeria.*

<sup>2</sup>*Department of Veterinary Microbiology & Parasitology, Faculty of Veterinary Medicine, University of Ibadan, Ibadan, Nigeria.*

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### **ABSTRACT**

The expanding bushmeat market in Africa contributes to the transmission of zoonotic diseases which may lead to global pandemics. This is exemplified in Nigeria where the first outbreak of Ebola Virus Disease (EVD), which originated from an imported case, was reported in July, 2014. Hence, this study was aimed at understanding the perception and practices of bushmeat handlers in Ibadan. Exploratory design was used to obtain qualitative data from purposively selected populations. Twenty-five bushmeat handlers were interviewed. Data revealed high level of awareness about EVD among most of the handlers. The EVD outbreak, which was perceived as a conspiracy, raised some level of anxiety among the populace because the disease is incurable. While some respondents have changed their lifestyles, others were not ready to change. The modes of prevention of the disease identified by the respondents ranged from hand washing to use of gloves. We conclude that continuous public health education and enlightenment about EVD is very important

**Keywords:** -Bushmeat; Ebola Virus Disease; Nigeria; Bush meat handlers; Disease outbreak; Perception; Prevention

\*Author for correspondence: *E-mail:* Email: [oglorvus@yahoo.com](mailto:oglorvus@yahoo.com); Tel: +234-8029442098

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### **INTRODUCTION**

Bushmeat, regarded as the meat of wildlife animals (Wilkie and Carpenter, 1999; Cowlshaw et al., 2004; CDC, 2014), is an important source of animal protein in Africa (Wilkie and Carpenter, 1999). It is one of the most valuable tropical forest products that is hunted for food and materials (BCTF, 2003; Swamy and Pinedo-Vasquez, 2014) ever since the human race evolved and is still viewed as a resource 'free-for-the-taking' especially in sub-Saharan Africa where indigenous people capture them for income and subsistence (BCTF, 2003; Cowlshaw et al., 2004). With the human population growth in West Africa, greater demands have been created for a variety of protein sources, especially bushmeat, when domesticated sources are unavailable (Bowen-Jones and Pendry, 1999). In a survey of bushmeat traded in the Cross-Sanaga Rivers region of

Nigeria, for example, Fa et al. (2006) estimated that over 900,000 kg of bushmeat was sold annually.

In most parts of Africa, bushmeat trade is not guided by any functional legislation and this allows for illegal and unregulated hunting, trading, and consumption. Aside from endangering the different animal species, researchers have linked unregulated hunting, trading and consumption of wildlife to several outbreaks of zoonotic diseases i.e. infectious diseases transmissible from animals to humans in Africa (Taylor et al., 2001; Karesh et al., 2012). In particular, the bushmeat industry in West and Central Africa is of great concern because of its influence on infectious disease transmission (Subramanian, 2012) as increased exposure to wildlife habitats, blood, fur, and saliva is known to increase the probability of disease transmission between animals and humans (Weiss and McMichael, 2004). For instance, Peeters et al. (2002) revealed that 'humans who hunt and handle bushmeat are exposed to a plethora of

genetically highly divergent viruses'. Some of the zoonotic diseases with wildlife reservoirs are: tick-borne zoonoses and tularaemia (Dumler, 2001), rabies, human anthrax, yellow fever, Lassa fever, bubonic plague, severe acute respiratory syndrome (SARS), human immunodeficiency virus (HIV), simian foamy virus and human T-lymphotropic virus types 3 and 4 diseases, as well as Ebola virus disease (EVD) (Kruse et al., 2004; Chomel et al., 2007; Weiss, 2008; CDC, 2014). These zoonotic diseases are said to be found in people that hunt, butcher, or keep primates as pets (Chomel et al., 2007; Galant et al., 2013).

Specifically, EVD is among the emerging infectious diseases believed to have been transferred to humans from non-human primates (Weiss and McMichael, 2004; Wolfe et al., 2005). Although it is not generally spread through food, it can be contracted in the process of hunting, butchering, and processing bushmeat for cooking during which people have direct contact with blood and other body fluids of a potentially infected animal (CDC, 2014). In fact, Richardson (2012) submitted that wildlife was linked to nearly all human outbreaks of EVD in Gabon and the Democratic Republic of Congo (DRC). Since the first case of Ebola was reported in Sudan and the DRC in mid-1976, subsequent outbreaks of the disease have occurred sporadically indicating that there is a likely reservoir of the virus. Within the context of globalisation of trade and travels, it is not an overstatement that everyone is vulnerable to EVD. This is more so considering the expanding bushmeat market in Africa which is estimated to supply five tonnes of bushmeat to Europe weekly (Chaber et al., 2010). In addition, individuals infected with EVD can migrate from the originally infected areas to new places with ease (Alexander et al., 2015), thus creating a situation that could potentially lead to a global pandemic as was observed with HIV/AIDS (Hahn et al., 2000; CDC, 2012). A good example is the case of Nigeria where the first outbreak of EVD, which was an imported probable case, was reported in July, 2014 (WHO, 2014). It is also important to note that the percentage of wild animals that are carriers of zoonotic diseases may be increasing, resulting in a growing concern for human safety (BCTF, 2003).

Since EVD poses a threat to regional and global health, there is the need to understand the perception and practices of stakeholders such as the bushmeat hunters, butchers and hawkers in the handling, selling and consumption of bushmeat. Although, EVD has received the attention of scholars in diverse fields of human endeavour, available studies have failed to provide better understanding on peoples' perception of handling and consumption of bushmeat in relation to the disease.

Majority of existing studies focused principally on the cause, mode of transmission and prevention of EVD with few behavioural studies on the socio-cultural factors related to the outbreak of the disease. An example is the study by Hewlett and Amolat (2003) carried out in northern Uganda which examined the effect of some cultural practices such as burial practices that could amplify EVD outbreaks as well as the social aspect of stigmatization faced by victims of the disease.

The perspective of the present study makes it very distinctive from other studies on EVD as it focuses on the perception and practices of bushmeat handlers in relation to the outbreak and spread of EVD. Despite the ban on its sale and the connection of the Ebola virus to wild animals, many people are not deterred from hunting, selling and consuming bushmeat. This behavioural factor may hinder effective prevention and control of the disease. It is against this backdrop and observable gap in knowledge that the present study was carried out to examine the perception and practices of bushmeat handlers (hunters, hawkers, consumers, restaurant owners) in Ibadan, Southwest Nigeria regarding EVD. The perception and attitude of bushmeat hunters, hawkers, consumers and restaurant owners to EVD is important since wild animals are known reservoirs of the virus and these animals are basically the source of livelihood for many people in both rural and urban parts of Africa. Hence, these categories of people constitute a highly vulnerable population that could pose enormous health risks to the global community. This study, therefore, examined the perception of the target population on their vulnerability to EVD and the prevention practices they observe to guard against being infected.

## **MATERIALS AND METHODS**

### **Experimental design**

Exploratory design was used to obtain qualitative data from purposively selected populations in Ibadan, the capital city of Oyo State. Ibadan was selected as the study site because EVD was reported in Nigeria as an urban epidemic, a new dimension in the history of EVD epidemics. The study population comprised all categories of bush meat handlers, namely hunters, traders and consumers in the city. Purposive and snowballing sampling techniques were used for the selection of respondents for the research. Some bush meat handlers were identified and sampled with the information given by a known seller in Aleshinloye market. Also, the researchers were able to contact some hunters through their Trade Association at their secretariat located at Oja-Oba market in Ibadan while

other bush meat sellers (canteen owners) and consumers were approached and sampled individually. Only those willing to participate were recruited into the study while all principles governing human research were observed in the study. Participants were briefed about the study objectives and its expected outcomes. The researchers observed all standards as set by the National Health Research Ethics Code (NHREC).

Twenty-five bush meat handlers (eight hunters, eight sellers, four restaurant owners and five consumers) were interviewed. Data collection lasted for 15 days in September, 2014. Information was collected through the use of In-depth interview guide, field note and a recorder. Following the interviews, the collected data were assembled, checked for recording and transcription. The data were then organised and coded in a thematic order while similar and different ideas were clarified in line with the objective. The responses were analysed based on content and presented verbatim.

## RESULTS

### Awareness of Ebola Virus Disease

Data revealed that most of the handlers' level of awareness of EVD was high. It was found that all respondents unanimously indicated that they were aware of the index case of EVD in Nigeria. According to one of the respondents:

*"Yes I have, I heard about it everywhere I go. People talk about it. It is even a talk of the town and everybody seems to know about it". (IDI, Bushmeat Seller, female/42/new garage/21-9-2014)*

On the source of the Nigerian experience of EVD, the level of awareness was low because not all the respondents were able to account properly for the source and identity of the index case in Nigeria. There was misinformation about the identity of the index case as some respondents were of the opinion that the man was a "white man". According to a restaurant owner who made an attempt to narrate what she understands about the incursion of EVD into Nigeria, the disease was "brought" to the country by a white man:

*"I am well aware of Ebola disease which was brought by one wicked Oyinbo (white man) from Liberia who wanted to kill all of us..." (Female restaurant owner/IDI/54years/new garage/17-09-2014).*

Although all the handlers in the study were aware of the disease, their sources of information differed from one person to the other. Some were informed by their family, friends and neighbors while others got the information through their customers, trade association, the mass media and other sources. However, majority of the

respondents got to know about the disease from their customers. According to a bushmeat hawker:

*"I heard from my customer, he usually calls me to deliver bushmeat or he may send someone, but one afternoon he called me as usual that he would be sending someone to me. He is a good customer that pays well." (IDI/female/38/bushmeat hawker/Elwure/22/9/2014).*

Similarly, another respondent reported that she heard about the disease from her children. In her words:

*"Initially, I did not know about Ebola virus but one day when my children returned from their school, they told me that there is a disease in town now which can be found in bushmeat and that it can kill someone within seven days. This news actually got me scared because the only disease that I know can kill within seven days is Sonponna (smallpox)." (Female bushmeat hawker/IDI/42years/new garage/21/9/2014).*

In addition, some other respondents said they heard about it from their associates. According to a respondent:

*"The level of awareness about Ebola disease is very high. I first heard about it among my fellow bushmeat hawkers and also from my neighbor who usually buys meat from some butchers. In our association (Association of Bushmeat Sellers), immediately the Ebola case was reported, all our executives started bringing in experts to come and talk to us about Ebola cases. It was during this time that we all realized that there is problem..." (Female bushmeat hawker/IDI/56years/Alesinloye /21-9-2014).*

The level of awareness of EVD among the bush meat handlers was very high due to the level of information flow through such means as online news, social media and the mass media, especially the local radio and television stations that have been instrumental to the dissemination of vital information about the disease. Some of the respondents said that they heard about the disease through radio. According to a male hunter:

*"I heard about Ebola for the first time on radio station saying that Ebola is now in Nigeria from Liberia and that few cases have been recorded. The awareness became strong when the woman that used to buy bushmeat worth N15,000 called me one afternoon and said she may not buy any bushmeat again until the case is over". (Male hunter/IDI/55years/Ajibode /15/09-2014).*

In his own explanation, a bush meat hawker who was assisted by her daughter narrated her experience about the information thus:

*"Although I have been hearing that there is a disease that kills faster than HIV/AIDS called Ebola, I did not know that the disease was so serious. It was during the time my younger sister who one of my daughters had gone to visit for two weeks in Lagos called me and said she is very ill (vomiting, headache and back pain). I told my friend whom we are selling bushmeat together and she told me there is Ebola in Lagos. I later got confused whether to go or not. Fortunately, what I thought could be Ebola infection for my sister was not Ebola. It was just a normal fever." (Female bushmeat hawker/IDI/43years/ New garage/21-09-2014)*

Similarly, when asked about his source of information about EVD outbreak in the country, another bushmeat handler who doubled as a hunter and bushmeat seller asserted that:

*"In this area where we normally sell our bushmeat, every one of us is already aware of Ebola virus. Prior to the time that people are saying Ebola is in Lagos (Nigeria), I have already had the premonition that this Ebola thing will soon cause problem and as expected our market sales actually dropped". (Male bushmeat hawker/hunter/IDI/41years/Aleshinloye/date).*

On awareness about the mode of transmission of the disease, most of the respondents were not very aware of the source of infection. According to a hunter:

*"Anyone that is not aware of Ebola now should be considered a walking corpse. Even in the interior village where I used to hunt, virtually all of the villagers are talking about it. The only challenges that they are having is how to know the symptoms as well as mode of transmission". (Male hunter/57years/IDI/New Garage Ibadan/17-9-2014).*

### Perception of Ebola Virus Disease

The way people view Ebola virus disease differs across space due, in part, to their level of understanding of the disease and other social characteristics of the individual. The perception of EVD among the respondents in this study, irrespective of their education and other socio-demographic characteristics, can be grouped into natural, supernatural and conspiracy. The quote below is that of a woman who believed that EVD is a supernatural disease being used by God to punish mankind. In addition, based on the symptoms, she likened it to a popular ailment. She explained thus:

*"This Ebola disease is a punishment from God. It is a major plague that God wants to use to punish humanity because we are already acting like the people of Sodom and Gomorrah. Ebola is like Sonponna (smallpox) because all I have heard about it can be likened to Sonponna symptoms." (Bushmeat hawker/New Garage/IDI/42years/21-09-2014)*

Some of the handlers also perceived EVD as a conspiracy issue. While one viewed it as a conspiracy of the white man, the other believed it was a government conspiracy against those who depend on bushmeat for their livelihood. A restaurant owner maintained thus:

*"This disease is from the word "Ebo" derived from "Oyinbo" (white man) and that is why it is called "Ebola". Anytime white men want to cause problem, they will generate a problem for the world. The world has not been able to recover from the scourge of HIV/AIDS and now Ebola." (Female restaurant owner/IDI/44years/17-09-2014/Agodi-Gate)*

Some respondents also shared the same view as the above respondent. According to a bush meat hunter:

*"When Patrick Sawyer came into the country, he did not go to the forest but the hospital. It is not as if we hunters do not believe in this disease or it cannot be found in bushmeat but what is more disturbing about it is that government is just assuming bushmeat too can cause the disease without asking those of us who have always been in contact with these wild animals (hunters and hawkers). If truly it is from these wild animals, we ought to have died since. (Male hunter/IDI/49years/New Garage/21-09-2014).*

From the above, it is evident that ignorance and poor understanding about the nature and mode of transmission

of the disease pervade the society. Some respondents said that the virus is transmitted through natural process.

According to a respondent:

*"I heard the disease doesn't have cure yet and that is the reason why it is very deadly; even HIV can be maintained but this disease once you have it you will die in days. I do not understand why they cannot find a cure or something that can manage the disease yet. It is a very deadly disease I haven't heard of before." (IDI/male/Bodija/15/9/2014)*

Some of the respondents expressed some level of anxiety about EVD because the disease is incurable. A respondent explained that:

*"Ebola is a disease that is very dangerous to human health. I know it is now in some West African countries and it is now in Lagos. All we are praying for is that it should not be in Ibadan." (Bushmeat hawker/IDI/Aleshinloye /56years/21-09-2014).*

The anxiety which EVD provokes is understandable given that no case has ever been reported in the country before the present outbreak and also because, apart from consuming bushmeat, people in this part of the country utilize parts of wild animals for different purposes ranging from spiritual fortification to treating health conditions such as infertility, and such practices and knowledge have been passed down from one generation to the next without any negative consequences.

According to a respondent:

*"In my village, one of the rituals a woman needs to perform during pregnancy is to eat a concoction made with monkey or bat meat from the bush. This is our cultural practice and since then no evil has befallen us, not even Ebola. (Bushmeat hawker/IDI/47years/Ojoo/Ibadan/20-09-2014)*

Another respondent also noted that:

*"As a bushmeat seller who also eats from her market, I can never view bushmeat as a danger to the general public. This meat, as we see it, is very useful for traditional practitioners and is used for medicine also. God loves us and so he won't allow such calamity on our market."(Bushmeat hawker/IDI/56years/Aleshinloye/21-09-2014).*

### Attitude to Ebola Virus Disease

Given the nature of EVD and information being spread about the disease, different attitude have been developed by bushmeat handlers to the disease as seen in this study. While some respondents have changed their lifestyles since they became aware of the disease, others were not ready to change. One of the handlers who have changed their attitude noted that:

*"Information received concerning Ebola has helped us in taking precautionary measures. I have been more careful than ever because I heard that this disease has no effective cure. We were told to be washing our hands more often than ever before. I have explained to my mum who is the owner of this restaurant. I have also tried to enlighten the people working for us about the disease. We now use gloves and nose mask while answering*

our customers. You can see it outside that we have a bowl where customers will wash their hands before stepping inside the restaurant.” (Student/restaurant assistant/IDI/52years/Mokola /18-9-2014)

The information gathered from the handlers and some of the consumers of bushmeat indicated that the EVD outbreak has brought about positive attitudinal change among the people. Many consumers no longer patronize the sellers as was the case before the outbreak. This shows that people avoided bushmeat in order to avoid being infected with the virus. One of the responses of the consumers about attitudinal change is as follows:

“We no longer eat bushmeat here even though, in my association, we normally request that they use bushmeat for pepper soup for us. But with this Ebola problem we have spoken to the woman to stop bringing the meat pending the time we shall be able to see the end of this Ebola.” (Bushmeat consumer/IDI/45years/Mokola/17-09-2014)

A bushmeat hawker further confirmed this below:

“This Ebola thing is affecting us more than the general public. Yesterday, a fellow bushmeat hawker who is also a good friend of mine called me and said her grand child is at the hospital and has developed complications during labor. This lack of sales made her broke and she was unable to pay for the hospital bills. We had to borrow money from our daily contributor.” (Female bushmeat hawker/IDI/42years/New Garage /21-09-2014).

An interview with the Secretary of the Bushmeat Sellers’ Association and suppliers also corroborated the statements above. She maintained thus:

“These days all our customers have run away, they no longer find pleasure in eating bushmeat. The last supply I got was not easy to sell. I sold below my purchase price and the rest is in the fridge because I am tired of begging people.” (Female bushmeat hawker/IDI/48 years /Aleshinloye /26-09-2014).

However, some of the respondents maintained that they can never stop eating bushmeat or stop the trade of hunting/hawking bushmeat because of EVD. According to a bush meat hawker:

“Why should I stop eating bushmeat? Why was HIV not linked to bushmeat? Bushmeat is a very healthy meat that even doctors ask their patients to eat. At times I do home delivery of bushmeat for people living around Alalubosa area. If government should stop people from eating bushmeat, there will be an automatic unemployment for the bushmeat handlers.” (Female bushmeat seller/IDI/42years /New Garage /21-09-2014)

Another handler submits that:

“At least, we, the sellers of this bushmeat do eat it and we are not vomiting neither are we purging or having the symptoms of the so-called Ebola. They should believe in what we are telling them and, more so, government should stop carrying unjustified news about Ebola virus disease.” (Bushmeat hawker/IDI/38years/New Garage /21-09-2014).

In fact, a bushmeat seller narrated her experience with one of her customers thus:

“One afternoon like this, one of my regular customers called me to get the meat in a very large quantity and send it across, he usually doesn’t ask for such quantity. When the person

arrived I asked: “why is oga buying this much?” He asked if I do not hear that Ebola is now in Nigeria and that before wild animals start having it, he is buying and saving them up in his fridge, that was how I got to know”. (IDI/female/38/bushmeat hawker/Elwure/22/9/2014)

Majority of the bushmeat hunters and sellers interviewed were yet to change the way they handled the wild animals they trade in. They said their awareness of EVD outbreak has not changed their attitudes in any way. However, the disease outbreak has impacted on their business because they might have to stop the trade or continue selling at extremely low prices which is unprofitable for them.

### Prevention Practices against Ebola Virus Disease

Different prevention practices against EVD ranging from hand washing to use of gloves, as well as educating others about the disease were identified by the respondents. Some of the modes of preventing EVD as pointed out by the bushmeat handlers include:

“The awareness from radio and television stations is enough for us, the bushmeat hawkers. We now wash our hands, use gloves and tell customers to cook the bushmeat very well before they eat. Even three days ago, officials of the Ministry of Health gave us a lecture on the management of bushmeat and its associated diseases at Mapo Hall. We are now conscious of the type of animals that died of stray bullets.” (Bushmeat hunter/hawker/IDI/Moniya/20-09-2014)

A restaurant assistant also stated that:

“Information received concerning Ebola has helped us in taking precautionary measures. I have been more careful than ever because I heard that this disease has no effective cure. We are told to be washing our hands more often than ever before. I have explained to my mum who is the owner of this restaurant. I have also tried to enlighten the people working for us about the disease; we now use gloves and nose mask while answering our customer. You can see it outside that we have bowls where customers will wash their hands before stepping inside the restaurant.” (Student/restaurant assistant/IDI/22years/Mokola/18-9-2014)

Another handler also discussed ways of preventing the disease thus:

“I have heard that we should be washing our hands regularly. You can see I have water and liquid soap outside for people to be washing their hands. This is the situation we have found ourselves in and we must live with it. Although I still sell meat to my customers who eat them even though they are aware of the Ebola virus. What they kept on saying is “Egbinodo ko ki n pa araoko” which means “The dirt inside the river does not affect the local people”. (Female Restaurant owner/IDI/44years/Agodi-Gate/17-09-2014)

Because they viewed the information linking EVD to bushmeat as conspiracy, many of the hunters and bushmeat hawkers opined that the type of information that would be more appropriate in preventing the spread of EVD should be more of sensitization on the disease

alone and not in connection with bushmeat. According to one of them:

*“Government should tell us how this Ebola can affect wild animals in the bush and at the same time, the generality of the society. Government should emphasize on the cause of the disease. I even heard that bushmeat as the cause of Ebola is just an assumption since the white men got HIV/AIDS from sleeping with animals and chimpanzees as well as monkeys. It is possible they must have gotten Ebola from these animals through sexual intercourse. (Male bushmeat hawker/hunter/IDI/44years/Aleshinloye/20-09-2014)*

From the statement above, the respondent was trying to show that EVD cannot be contracted through eating and handling of the wild animals but rather through sexual intercourse with animals. Another handler who is a woman explained that she would continue to prepare the bushmeat the old way as there was nothing to prevent. In giving her opinion about the prevention of EVD, she said:

*“...I still prepare my bushmeat the way my mother taught me, or how should I change? Wear gloves and mask before boiling or smoking my meat? No way”*

*(IDI/female/hawker/38/21-09-2014)*

Since many of the handlers did not believe wild animals are the major carriers of EVD, they also found it difficult to believe that avoiding contact with wild animals is one of the ways through which it can be prevented. One bushmeat hawker explained thus:

*“My elder brother is a hunter in Ondo State and so is my father. The only time I heard something similar to it was when I was young and my brother was attacked by a monkey. He had fever for several days but with normal herbs he got better in days. I don't believe animals are the only sole carrier of the virus”. (Male hunter/IDI/52years/Ajibode/15-09-2014).*

The statement made by the respondent quoted above reveals the risks that hunters and handlers of wild animals face on a daily basis and how vulnerable they are to contracting zoonotic diseases through wild animals, thus putting the larger society at risk of the infections

## DISCUSSION

The findings of this research can be explained with the Weberian Social Action Theory. This theory focuses on the meanings and intensions behind actions of individuals (Olutayo and Akanle, 2013). According to the theory, an action does not become social unless it involves two or more persons as people tend to take cue from the action of the other person (Giddens, 2001). In this study, bushmeat handling practices are viewed as a social action involving diverse categories of people referred to as handlers. This study demonstrated the interrelationship between one handler and the other, and how this influenced awareness, attitude and prevention practices about the EVD.

The level of awareness about the EVD outbreak among the respondents was very high. Data showed the flow of information among the handlers and their significant others. It also showed that an individual's level of awareness was influenced by the perceptions and actions of others with which they associate. This observation is consistent with the findings of a study conducted in Sierra Leone (Stipe, 2014) and a similar study by Shittu et al. (2015) which was carried out in Ilorin, Nigeria but with some differences. Unlike the studies mentioned above, all the respondents in this study had heard about the EVD outbreak and this may be due to the small sample size used for the study. It could also be due to the period during which the study was carried out. While the study in Sierra Leone was conducted before the present study, that of Ilorin was conducted later. It is possible that awareness level has changed by the time this study was carried out.

The source(s) of information about the EVD outbreak in the present study differ from one bushmeat handler to the other; while some got to know about it through their families and friends, others were informed by their customers, trade association and mass media. Both the Ilorin and Sierra Leone studies identified the radio as the primary source of information mentioned by the respondents. However, most of the bushmeat handlers interviewed in the present study reported they got the information about EVD outbreak in the country through their customers. This may be because the item in which they trade was identified as a major source of getting infected with the virus. Although the study respondents were highly aware of the EVD outbreak in the country, some were not really convinced about the signs and symptoms, and mode of transmission of the disease since they had not seen any one infected with the virus, as no case was recorded in Ibadan while the outbreak lasted.

On the perception of EVD, three types of belief surrounding EVD were identified among the bushmeat handlers: natural, supernatural and conspiracy. The misconception about the mode of transmission of EVD as found in this study is similar to that observed in the Ilorin and Sierra Leone studies. Most of the handlers did not believe that wildlife could serve as reservoirs of Ebola virus. Since they were always in contact with wild animals and no case had ever been reported among them, majority of the bushmeat handlers (hunters and hawkers) perceived EVD as a conspiracy against those whose livelihood depends on the wild animals. This finding is important and points to the need for government and relevant health authorities in the country to increase efforts aimed at organizing continuous public enlightenment campaigns on EVD and other zoonotic

diseases to which these bushmeat handlers are exposed daily in the course of sourcing for their livelihood.

The respondents who perceived EVD to be a natural disease that can be transmitted through contact with people, objects or animals carrying the virus were mainly consumers of the bushmeat and restaurant owners while only few sellers and hunters believed it to be natural. Those who believed that the news of the outbreak was a conspiracy were mostly hunters and sellers of bushmeat. Only a handful of the respondents viewed the disease as a consequence of sins against the Almighty through homosexual acts and sleeping with animals. Furthermore, different types of attitudes were found to have been developed towards EVD outbreak by the bushmeat handlers interviewed. Overall, the EVD outbreak did not really change the bushmeat handlers' behaviour except for some. This finding is consistent with the CPPA (2014) study among Lagos residents which discovered that EVD did not stop people from living their normal lives. Other attitudes found among the respondents toward EVD outbreak are: resentment, frustration and anger. This is understandable because the outbreak adversely affected their businesses, thereby making it difficult for them to survive as members of the public were cautious and avoided consumption of bushmeat as noted by CPPA (2014). The bushmeat handlers viewed the reaction of the general public as outrageous. Hence, the various protests and campaigns organized by the hunters and bushmeat traders' associations to enlighten and convince the general public about the safety of bushmeat consumption.

Information received from different sources influenced respondents' prevention practices. It was observed that information disseminated through radio, television, newspaper, friends and families as well as neighbours impacted on the people's knowledge about preventing EVD. Most of the respondents explained that they had been practising the recommended preventive behaviours such as hand washing, use of gloves and hand sanitizers, avoiding body contacts as well as educating others about the disease. Unfortunately, an important source of transmission was neglected by some of the respondents handling bushmeat. Since no case of the disease had been reported among them in particular and the country in general before the present outbreak, the handlers refused to accept that EVD can be transmitted through contact with the blood and fluids of wild animals. Although most of the consumers interviewed have stopped eating bushmeat while many restaurant owners have also stopped selling it, those always in direct contact with fresh carcasses of wild animals (hunters and sellers) did not believe they were vulnerable to EVD through handling and processing of

bushmeat. Thus, they have continued hunting, processing, selling and eating the meat of wild animals. In order to reduce the vulnerability of this group of bushmeat handlers (i.e. hunters and sellers) to EVD and thereby lowering zoonotic disease risk, we advocate a combination of improved education and provision of alternative livelihoods as recently suggested by Friant et al. (2015) as well as appropriate legislation and law enforcement on wildlife hunting in Nigeria.

### Conclusion

Generally, social interactions were observed in this study to have played an important role in the awareness, perception, attitude and prevention practices against EVD. Ebola virus disease poses a public health risk to human existence in Africa especially and the global community as a whole. Since ignorance has been identified as a major reason why EVD still persists, the need for continuous public health education and enlightenment about the disease and other zoonotic diseases, particularly in the rural hunting communities, cannot be overemphasized. This should be done along with appropriate legislation and law enforcement on wildlife hunting and poaching because of the unrestrained access which people have to these animals.

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