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Ebola outbreak in Nigeria: perceptions from commercial motorcyclists and passengers in Ibadan, Nigeria

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Abstract

The outbreak of deadliest and most widespread Ebola virus disease (EVD) in West African countries was not only unexpected but also sudden in places like Nigeria. The epidemic was an indication of weak health systems characterised by inadequate precautions and low knowledge of containment. Although Nigeria was able to contain EVD much earlier, people's perception, which also influenced their responses, might enhance the spread and retard containment. This study utilized 25 in-depth interviews conducted with commercial motorcycle–taxi (Okada) riders in key locations in Ibadan, Oyo state, to document their perception about EVD outbreak. Series of sociocultural practices such as handshaking, hugging and embracement identified were favourable to transmission of EVD and affected containment. Regular handwashing was difficult and not cost-effective to practice. The perceived trust in God's intervention could make treatment seeking and prevention slower to achieve. The potential of sociocultural practices, such as handshaking and hugging, as driver for transmission of EVD may influence the perception of motorcycle–taxi riders in the prevention and containment activities in Nigeria. Hence, understanding people's perception on handwashing practices, hugging and butchering of bushmeat should be given priority in designing programmes of EVD prevention and control in Nigeria.

Introduction

Ebola virus disease (EVD), known as Ebolavirus haemorrhagic fever, belongs to the family of *Filoviridae,* which is also called *filovirus* [1]. EVD is predominantly associated with high rate of fatality among human after its initial outbreaks in 1976 [2, 3] and by 2013 it had caused ~20 recorded outbreaks across some East and Central African countries [4, 5]. The EVD outbreak in West Africa marked the 25th known outbreak in history [6]. However, the 2014/15 West African outbreak was so sudden that it unexpectedly changed everything such that the outbreak was described as the '"Black Swan"—the inevitable consequence we did not foresee' [4, 7–10]. The epidemic was so widely spread and more deadly that WHO recorded 28 714 confirmed cases of Ebola virus with 11 372 deaths [10] amounting to 39.6% fatal cases.

The natural reservoir of EVD for human transmission is unknown, even though speculations attributed the outbreaks to contact with carcases of chimpanzees, monkeys, gorillas, bats and bat droppings and forest antelope [10, 11]. Consistent appearance of the virus is also associated with environ-climatic conditions such as rainy season which enhances increase in insect and mammal populations [12]. Humans contract the natural reservoir through activities such as deforestation, logging, camping, animal research, global warming and road construction [11]. Human-to-human transmissions are usually driven by close contact with live or deceased persons, direct contact with blood and

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body fluids ('such as sweats, saliva, urine') of the infected mainly in the unprotected home care settings and during participation in traditional burial practices [3, 13, 14].

The incubation period of EVD indicates a period from infection to onset of signs and symptoms. The symptoms non-specific manifestation of EVD at this time may include sore throat, muscle pain, headaches, fever, vomiting and diarrhoea [15, 16]. These start between 2 days and 3 weeks after contracting the virus. These symptoms are followed by Ebola haemorrhage with the manifestation of vomiting of blood, bloody diarrhoea, cough with blood, nosebleed and bleeding from injection sites which ultimately lead to multi-organ failure and death [15, 17].

The outbreak of the virus in Nigeria had negative impact on individuals and various sectors. To prevent the spread of EVD in Nigeria, over two billion Naira ($10 000 000.00) was expended by the Nigerian government for the establishment of isolation centres, case management, contact tracing and procurement of required items and facilities [18, 19]. Brown *et al.* [4] described how inequitable distribution or shortage of health workers in West Africa has affected the care of sick individuals. Brown *et al.* [4] noted that sick relatives were nursed at home by family members, while further care was often sought from traditional healers, unofficial providers and private pharmacies rather than government health facilities. Check [20] frowned at the institutional collapse of routine health care during the EVD outbreak, because of relapse in the use of clinics by both patients and providers, mainly for fear of infection. Experts opined that 'the public-health impact will be huge' [20]. Check [20] also reported the avoidance or bypass of clinics to even treat such illnesses as malaria, for fear of learning the worst, because 'the symptoms of malaria mimic Ebola' as noted in rural Liberia. Jeremy and Peters [7] reported how disintegration of health care systems has had profound impact on the people's health beyond Ebola, for lack of full service attention of health workers, or non-functioning facilities in the affected countries. Importantly, ensuring that community health workers were equipped as adequately as foreign aid workers to guarantee the safety of community health workers was a concern. Likewise, finding appropriate ways of minimizing moral distress among health workers who, already were working under extreme circumstances and with limited resources to meet their professional and ethical obligations to patients, was critical [21], especially in a resource-poor setting like Nigeria. The economic institution was highly affected by the downturn of individual- and public-owned businesses generally through heavy low patronage [22].

Public perception of the EVD is a strong influence on containment of the disease [23–27]. Carman [23] maintained that Ebola outbreak in the United States was a great threat to the public and policy makers, noting also that Americans overrated the chances of contracting the virus because of people's perception and beliefs. Rubsamen *et al.* [24] investigated risk perceptions of EVD in Germany and reported that risk misperception could lead to stigmatization of those perceived as sources of the virus. They submitted that airborne transmission and usage of public transportation were perceived to be major ways of contracting EVD. Marmon [25] noted that the real fear of the disease was in Pan-Africa since the rest of the world believed that EVD was an African issue. Movement of people from rural to urban and within urban areas was a major driver of the West Africa epidemic of 2014–16 (Frankel TC. It was already the worst Ebola outbreak in history. Now it's moving into Africa's cities. The Washington Post. 30 August 2014. Available at: https://www.washingtonpost.com/world/africa/it-was-already-the-worst-ebola-outbreak-inhistory-now-its-moving-into-africas-cities/2014/08/30/31816ff2-2ed6-11e4-bb9b-997ae96fad33_story.html). A lot of flights to African countries were cancelled and resorts suspended to the extent that the continent tried to internalise the problem. CDC [26] reported that people perceived EVD in Liberia and Sierra Leone as an evil spirit, devil or poisoning. They believed that religious rites have to be performed on those who died of the virus, thereby creating avenue to have close contact with the dead. In Nigeria, Oduyemi *et al.* [27] reported

that EVD was considered a product of witchcraft; a biological terrorism targeted at checkmating population growth; or a method by America to establish single global leader to rule the world. The early containment of the virus by some of these countries, apart from Liberia and Sierra Leone, was due to the government interventions. For instance, Nigerian government leverages the awareness creation strength of the media to educate the country about the virus and the threats its prevalence could constitute to the country [28]. In addition, Nigeria's Ministry of Health also tracked and made available to the public daily update on the incidence of EVD [29]. Although awareness and promotion of preventive measures against contracting EVD occupied all public spaces in Nigeria, availability of and accessibility to misleading information about possible causes and means of transmission of EVD also influenced people's perception of the disease.

As the population of Ibadan grows, the city expands into new locations and living areas. New markets and lock-up shops also emerge to meet the city's economic needs. Explosion of events and activities necessitate transportation from place to place. As a result, the use of taxi-cab only may not be sufficient to reach some locations in the city. Commercial motorcycles (Okada taxi) have emerged as an alternative and or supplementary means of transportation to meet the transport needs of the people [30]. From large cities to small towns, Okada taxi has grown to become almost the first choice of transportation for intra-city mobility in Nigerian roads. The Okada in most cases taxi more than one passenger at a time to reduce charges. This practice cannot be without body contact between the rider and the passenger(s). The situation may be worse if the Okada-taxi is involved in an accident. A report by Odamo [31] indicated that casualties of road traffic accident at Igbobi Orthopaedic hospital in Lagos Nigeria was between 70.5% in 1991 and 70.8% in 1994. An increase in population of patients with fractured limbs after the introduction of commercial motorcycle taxi in Lagos was also recorded [32]. Akanle and Chukwu [33] observed that Okada-taxi riders exposed their passengers to road accidents; they are often reckless as many of them do not observe the road code and are mostly in a hurry even in the poorly laid out and congested roads. The rate of accident involving motorcycle was found high also in industrialised countries including places such as Colorado, Italy, Central London and Thailand as reviewed by Akinlade and Brieger [30].

Nevertheless, the use of commercial motorcycle (Okada—taxi) is an acceptable norm in place of taxi–cab in Nigeria. The use of Okada-taxi actually favours the heavily congested urban roads in many parts of the country. Besides being able to move briskly and easily in the many urban roads, Okada can also more easily navigate and meander in heavy traffic and gridlock [33]. Body contact is easily possible and at the same time indispensable in the use of Okada for transportation. Body contact is one key mode of transmitting EVD. This makes Okada-taxi one regular and possible means that can promote transmission of contagious and infectious diseases such as EVD, Tuberculosis and skin infections for a category of people in Nigeria. This is in addition to the low knowledge of emergent EVD transmission, treatment and containment in the study setting. This article documents Okada-taxi riders and passengers' perception of EVD in Ibadan, Oyo State Nigeria.

Materials and methods

This study adopted a combination of qualitative approaches. In-depth Interview (IDI) conducted in Ibadan metropolis and review of grey literature was utilized to document perception of EVD from the wake of the disease in Nigeria to its containment. Extended non-participant observation was also undertaken at key locations where influx of people was very high to capture all the nuances of the research focus. Observation was carried out at major junctions in the local government areas (LGAs) in Ibadan city to establish the presence of Okada parks, and identify common features which differentiate commercial Okada riders and passengers from private owners. Activities observed included location of Okada-taxi parks around commercial Taxi and Buses Park, influx of passengers to Okada parks,

population of Okada, sitting arrangement and travel directions of Okada from the park. After initial observation, five locations of high patronage were selected for the study. Ibadan is the largest indigenous yet metropolitan city in sub-Saharan Africa with 2 550 593 population. A more recent 2014 data from the National Population Commission (NPC) office in Ibadan put an estimated population of the city at 3 232 016. The city is located on major transport route to northern parts of Nigeria. It is served by many private and public health institutions which are located in various areas of the metropolis. The first teaching hospital (The University College Hospital) in Nigeria, and Adeoyo Specialist Hospital, are examples of health institutions in Ibadan.

With accidental sampling technique, 25 participants were selected from locations with high Okada-taxi traffic in each of the four LGAs of Ibadan metropolis. The study proposed 32 interviews with Okada riders and the same number of interviews with Okada passengers in all the four study locations. However, only 25 interviews were conducted in each category at the time when saturation point was reached. At least, six interviews (for each category) were conducted in each location before it was realised that no new information was added. The sampling of participants was done by approaching Okada riders and their passengers (clients) in turn, shortly after clients climbed Okada and before the riders set to move. Participants were politely approached for interviews. Each interview took not <45 min. Immediately after one interview, interviewers approached the next rider on the turn for same process. The study locations were Agbowo in Ibadan North LGA; Beere in Ibadan South East LGA; Iwo Road in Ibadan North East LGA, and Mobil Area in Ibadan South West LGA. Data collection for this study was completed in mid- October 2014, barely 2 days before Nigeria was declared Ebola free. The consent of each participant was sought after explaining the purpose of the study and before the interviews commenced.

The IDI guide for the study was designed in English. It was translated into Yoruba, and pidgin by someone who has the expertise—with higher academic degree. The Yoruba and pidgin language versions were also back-translated by another expert in Yoruba, pidgin and English language. This process enabled quality assurance and internal consistency in the content of the IDI guide. The guide was standardized—piloted in another location, after which necessary corrections were made. Interviews were conducted by two interviewers who were doctoral students and highly skilled in social research. Two-day training was organized for the interviewers. The first day addressed the content of the guide, location maps of study areas and information about EVD. The second day involved data collection procedures role-play. IDIs were conducted in Yoruba, the local language of the people in the study setting. English language and Pidgin language were also adopted to interview those who could not speak the local language. Interviews addressed the knowledge of EVD transmission modes, perceived means of prevention of EVD and cultural practices that promote or inhibit control of EVD. Environment for each IDI session was conducive for the participants. As the interviews were conducted, they were recorded in digital tape with the approval of the respondents. All the interviews were later transcribed verbatim in the actual language in which the interview was conducted. The transcripts were then word-processed with a standard Microsoft document. After that, they were translated into Standard English language by two experts in Yoruba, pidgin and English languages. In order to ensure quality, ascertain internal consistency and accuracy and ensure high confidence level, the transcribed notes were given to the two experts in English translation and the translated notes received from both were compared for consistency.

Responses from the field were analysed using Atlas.ti software and presented as verbatim narratives and ethnographic summaries. Using the framework approach, textual data from interviews and discussions were subjected to content analysis to identify key themes [34]. The framework approach allows for both deductive and inductive theme identification, which can be explained through two phases consisting of five main steps. The steps include familiarization with the data, development of a thematic/coding framework, and

indexing/coding data. In the data management phase, charting and mapping the data constitute data explanation phase. Both phases enhance theory- and data-driven analysis, especially since this is an under-researched area [35]. In clear practical terms, the analysis of the transcribed interviews was done using a codebook created by the researchers. The codebook provided stable frame from which the researchers systematically coded [36]. Coding as used here means the process of identifying themes—i.e. analytic categories in text [37]. The codebook guided a deductive application of codes to chunks of text in the transcripts in relation to the study's research questions. Additional codes were inductively generated using an exploratory 'grounded' approach [38] and they emerged from the Okada participants themselves, as suggested by Charmaz [39]. Eighteen codes were initially developed as part of the codebook. The codes were then combined into broader categories of theme for interpretation. Comparisons and trends were then identified using data matrices as suggested by Maxwell [40]. Atlas.ti v7.1 allowed for stratification of data by gender, location and age. The overall result was produced and presented using content analysis technique and supported by direct verbatim quotation of responses to substantiate the content analysis.

Narratives from field metadata of the respondents

The overall majority (60.0%) of the respondents were adults. There were more male respondents (60.0%) than there were female respondents. Almost half (48.0%) of the respondents had attained secondary school education as at time of survey. Majority (92.0%) of the respondents were either artisans, Okada riders or traders. The monthly income of the respondents ranged between N16, 000.00 (US $87.06) (the minimum) and N30, 000.00 (US $358.12) (maximum) at N183.77/$1 US as at December 2014. Transporting more than one passenger at a time increased Okada rider's income and reduced passengers' expense as well.

Perceived knowledge of Ebola

Awareness of EVD was widely spread. Most respondents confirmed hearing about the EVD through means such as radio, television, social media, print media, religious bodies or word of mouth information. The public awareness was reinforced by the severity of the virus which prompted the media, the government and international bodies to process and promote messages that enhanced prevention and control of EVD. Views expressed by one of the participants indicate this:

> Hmm, we hear a lot all over. . .., I know much about Ebola, even though I have not seen anybody with the disease. Part of the information I have gathered on Ebola through radio and social media have made me to know that the disease has no cure. Also, I know that whoever has the disease would be bleeding and vomiting blood, which means that nobody should get near to the person until such case is reported at a government hospital (IDI/43years/Okada-rider/Agbowo).

Clearly, participants share the belief that it is only when a person starts to vomit blood and bleed that the person has the virus. This clearly implies that most Okada-taxi riders were aware of possible implication of contracting the EVD without necessarily knowing the details pertaining to the signs, symptoms and necessary preventive actions to avoid contact during incubation period. Participants reported that they were all reached by information about EVD. However, they were exposed to different versions of the information. Some participants appeared to be more knowledgeable about the virus than others were. Narrative from a participant who could identify the signs and symptoms of the EVD is provided next:

> You see, I know some things about Ebola virus. In fact, I have seen several times on television, in newspaper, Facebook and other social media the picture of the virus which looks like worms. Meanwhile, this is the very first time that the outbreak of this

> particular disease is experienced in our country, Nigeria. Be that as it may, the virus has no cure. People who have the virus would have severe headache and high body temperature. In the end, such people would start to vomit blood until death comes, especially with our poor health system. In addition, the disease is also new to our health workers. We are advised to avoid body contact and to practice handwashing and use hand sanitizers (IDI/34years/Iwo-Road).

The participants indicated that they have some level of knowledge about the EVD. They acquired the knowledge from information made available through different means of communication. They displayed that they had some information relating to the onset and manifestation of the disease. This implied that information disseminated to the public through popular means of communication is, to some extent, promoted knowledge of the disease. However, the awareness created did not translate to adequate knowledge as the respondents were found to demonstrate an inadequate knowledge of the disease. Such inadequate knowledge is dangerous, especially when found among Okada riders, whose job predisposes the public to the risk of contracting the virus through body contact.

Perceived means of transmitting EVD

The participants demonstrated knowledge of means through which the virus is transmitted. Transmission, according to the respondents, could take place through human-to-human or animal-to-man means. The specific examples given by the participants are body contact, consumption of bush-meat, direct contact with clothes already contaminated with the virus, and contact with animals and seafood. They indicated also that the disease might be transmitted through airborne means.

Body contact

The respondents indicated that body contact (human-to-human) is a means through which the virus is transmitted. The media (print, audio and visual) emphasized this mode of transmission in their awareness campaigns about the EVD. The respondents also displayed the knowledge of it. The respondents maintained that the EVD was terrible and deadly. They regarded it as a disease which had no treatment yet. One respondent expressed this position thus: '*What I can say is that it is a terrible disease that can be contractd through body contact'* (IDI/25 years/Iwo Road). Another respondent corroborated the position that '*Ebola is mostly contracted through body contact'* (IDI/26 years/Agbowo). The respondents considered the disease of high severity. This is evident in the position maintained by a respondent in Mobil area:

> Ebola is a deadly disease that nobody has been able to control. Through body contact, one can easily contract the disease. It is easy to contract the disease through handshake or bodily contact (IDI/23 years/Mobil area).

The respondents were not only aware that the disease is communicable through body contact, but also of the preventive measure to avoid such contact. A respondent displayed this awareness thus:

> They said we should avoid body contact and not eating some things like bats, pork, and bush meat (IDI/40 years/Beere).

Direct contact with clothes, animals and sea foods

In addition to body contact, direct contact with infected persons' clothes and materials was also reported by the respondents as means of transmitting the EVD. Okada riders and passengers indicated during the interviews the preventive measures they took against these as well. Okada passengers indicated that they often used nylon (polythene) to cover head before wearing safety helmets provided by Okada riders. One Okada rider stated that Ebola virus could only be spread through long body contact, and contact with clothes and other materials that were previously used by someone who was already a victim:

> Transmission is through contact with clothes and not through temporary direct contact with

> the person. With helmet, a nylon is used before you wear the helmet. So I don't think body contact as it is can really occur (IDI/45 years/Okada rider and Security officer/Iwo Road).

Respondents also held the belief that direct and indiscriminate contact with animals, especially those animals feeding on fruits, and consumption of sea foods can predispose people to contracting EVD. This view is captured by the following quotation:

> I think Ebola is caused by indiscriminate contact with animals. I do not totally rule out the role of animals eating fruits as a cause of it too. I think it can also be transmitted by fishes. Anyone can throw anything into water bodies and fishes will swallow it (IDI/33 years/ Agbowo).

Transmission through consumption of bush meat

Bush meat is an African term for animals hunted for consumption and for other purposes. Bush meat, often smoked or dried and salted, is considered a major source of food and livelihood for people in Nigeria. It is derived from series of wild animals which could include bats, monkeys, grasscutters (cane rats), and antelope. However, during Ebola crisis in Nigeria, bush meat became unattractive to people and that discouraged both hunters and sellers. The respondents were aware of the need to avoid consumption of bush meat unless it was killed in their presence:

> I heard that animals in the bush can transmit it and that we should not eat such animals. I will only eat bushmeat if the person kills it in my presence (IDI/22 years/Mobil).

Instances of incomplete knowledge

Although the respondents were aware that EVD could be contracted by eating bushmeat, they are unaware that the very process of killing the bushmeat could expose them to the disease. Some of the respondents were also sceptical about the fact that one can contract Ebola through consumption of certain bush meat. One respondent expressed this distrust in the following quotation:

> Yes. They said we should avoid eating bushmeat, bats and monkeys. But I don't think those things can cause Ebola (IDI/30 years/ Agbowo).

The financial or social benefits that people derive from consumption of bushmeat may be a direct reason for this distrust. Social benefit is earned when bushmeat is used to entertain visitors or is eaten for relaxation.

Transmission through air

Ebola virus is not a respiratory disease. Therefore, it is not airborne. Nevertheless, some of the respondents had the impression that the virus could be spread through air routes: 'We were told that it is spread through contact with air from Ebola victim' (IDI/30 years/Iwo Road). The same position was also maintained by another respondent: 'They said it is a killer disease and it is airborne (IDI/30 years/ Mobil).

Perceived means of EVD prevention

Hand washing

The participants were aware that handwashing was recommended as an important preventive strategy. Nevertheless, the awareness did not always translate to practice. For instance, a discussant in this study who was an Okada rider curiously expressed that people could forget to wash their hands even before eating, let alone to protect against EVD:

> But how frequently can an Okada rider wash his hands? To be sincere, I have just finished eating bread and I did not even remember to wash hands. (IDI/55 years/Okada-rider/ Beere)

Another respondent also reinforced the possibility of forgetting to wash hands: One might eat without

washing hands (IDI, 45 years from Agbowo). Another misconception among the respondents is that hand washing is important only before meal.

> Hand washing using detergent and water is very important. When I get home I wash my hands. When I'm on duty I don't eat until I get home. So, I do not wash my hands when I'm on duty. At home I wash with soap and water before eating (IDI/45 years/Okada-rider/Iwo Road).

Another respondent believed that regular hand washing may be hampered by the nature of an individual's occupation:

> When I get home, I use soap and, sometimes, Dettol disinfectant, to wash my hand. I cannot be washing my hands all the time while at work. But if I want to eat, I will wash my hands or I wait till I get home before I wash my hands (IDI/26 years/Agbowo).

Income level of individuals could also prevent them from practicing proper and effective hand washing. The cost implication of hand washing may undermine the willingness to practice it. This is applicable to individuals who live below the minimum wage since having to buy (sachet) water (in an environment where water is not a free good) would deplete the meagre income on which they live:

> I wash my hand when I want to eat. I wash with soap and water. But, it is only when one wants to take meal that hand washing becomes very important. Attempt to buy water at all the time one takes a passenger is difficult. How much will one take home in that case? (IDI/27 years/Mobil Road).

It was also found that not all the respondents understood the process of proper hand washing. Such individuals washed their hands without a cleaning agent:

> I do not wash my hands with Dettol. I wash with ordinary water. I wash when I want to eat and this is most applicable to many people that I know (IDI/35 years/Mobil).

Personal and food hygiene

General hygiene practice was reportedly high among the respondents. A respondent reported that:

> It is important to have one's bath and keep one's body clean and healthy. Hygiene is about neatness and so you shouldn't look dirty when you are going out (IDI/45 years/Iwo Road).

Another respondent from Agbowo area attested to that:

> I do not also leave my food or drinking utensils in the open. They are protected (IDI/35 years/Agbowo).

The way another respondent observed personal hygiene is captured in the next quotation:

> When I'm done with work, I would go and have a bath and my work clothes would be kept somewhere such that even if I can't wash it, I will tell my wife to help me dry it in the sun preferably. It is not that same clothes that I would wear the next day. The sun would have dried off the sweat to prevent it from smelling (IDI/30 years/Iwo Road).

In addition, the respondents (Okada riders) acknowledge that sharing useful information about personal and food hygiene is everyone's responsibility:

> We practice hygiene and we could also encourage people to wash their hands regularly and cover their foods to prevent rats from coming in contact with the food (IDI/22 years/Mobil).

God's hands can remove EVD demon

Christianity and Islam are the two major religions in Nigeria. The fear that Ebola kills faster than malaria made some people to resort to prayer to protect themselves against EVD in Nigeria. The respondents also believed that only God's hands could end Ebola in Nigeria. The extracts below reveal respondents' positions on perceived supernatural dimension to Ebola:

> We cannot control this thing. Therefore, it leaves us with the option of calling on God to

> help us and see us through. God will not allow it to come to Oyo state (IDI/55 years/Male/Beere).
>
> Everything is in God's hands (IDI/45 years/Female/Iwo Road)
>
> It is only God that can protect (IDI/23 years/Female/Mobil).
>
> In churches and mosques, schools, body contact occurs everywhere. Therefore, it [the solution] is in the hands of God (IDI/45 years/Male/Mobil).

Although Ebola and other infectious diseases may escalate in the society by actions such as trust in prayer which is devoid of scientific and subjective interpretation, conversely, the fear of contracting the virus even at the religious gathering centres caused a lot of isolation.

Cultural practices that promote or inhibit control of EVD

Connotations of avoidance of body contact

One of the effective ways of preventing human-to-human transmission of Ebola virus is through avoidance of direct or close contact with people living with Ebola symptoms. Although this is a more active preventive best practice, it has cultural implications. For instance, certain cultural styles of greetings to show acceptance, and happiness such as hugging and handshaking encourage contact. The respondents opined that avoidance of body contact as a preventive measure against EVD might promote hatred and could discourage intimacy among people. One respondent expressed that:

> This has developed a form of hatred for some people whose social way of greeting has changed (IDI/32 years/Beere).

Another respondent reinforced the potential cultural damage that EVD has brought to the fore in the ways people relate with one another:

> And they (the media and health workers) even said we should avoid handshake even with our friends. The problem of Ebola and the problem of body contact are serious issues that would have caused problems in Oyo state (IDI/25 years/Mobil).

The way business is run was also a concern. Marketing in informal settings in Nigeria is such that buyers and sellers do have body contact. Since body contact occurs unconsciously sometimes, avoidance of contact was considered impossible by the respondents in this study:

> But I don't think the restriction on body contact can hold. While walking around in the market, for example, people do make body contact. The fact that Ebola is mostly contracted through body contact makes it very difficult to prevent or protect (IDI/26 years/Agbowo).

Market structure and sitting arrangement in public buses also make it impossible for people to avoid body contact. The public transport system in the country is lax in enforcing the laws guiding overload and roadworthiness of vehicles. Passengers are left with no choice than to commute in overcrowded public vehicles, even though that increases the risk of body contact. One respondent expressed how indispensable public transport is:

> When we go to the market, take a bus, a cab, or a bike, there is body contact. I also feel that on Okada the risk of body contact is even lower than what it is in a cab or on a bus, where people are closely seated side by side. Without public transport, business activities may not be possible at all because we can no longer trek long distance as we used to do (IDI/45 years/Iwo Road).

This response indicates that the risk of contracting contagious disease is high as people go about their daily lives. Health education and focussed intensive awareness have to be implanted in the environment to make it acceptable as a workable solution to EVD. That is more proactive approach and it can promote acceptance of isolation of victims from active

participation in some socio-cultural practices that may favour transmission.

Contact with body fluids

In addition to the belief that avoidance of body contact is impossible in cultural settings, some respondents believed that EVD cannot spread without direct contact with body fluids. They maintained that except in the presence of body fluids such as sweat or blood, body contact can transmit EVD. One respondent expressed that thus:

> Most of the time I have gloves that I use all the time though I do not have it here now. If someone sits behind an Okada rider and they have body contact in the process, I do not think that is sufficient ground for contacting Ebola. I believe it is when body fluids like sweat touch one another that the disease can be transmitted. Like HIV/AIDS, it is transmitted through blood contact (IDI/27 years/Iwo Road).

Acceptance of hand sanitizers

A number of factors prevent people for adopting hand sanitizer for disease prevention. The factors include inadequate knowledge of its potency, its cost, and availability of fake products. Despite that hand sanitizer is recognised as potent for disease control, the respondents doubted it could be effective against EVD. Health workers and the media promoted its use during the outbreak. However, some respondents with low education attainment level expressed concern on availability of hand sanitizer brands that were trustworthy. Such people resorted to locally brewed alcohol-based hand sanitizers to reduce the risk of contracting infections during the EVD outbreak. Few of the respondents did not adopt hand sanitizer because of its cost implication. Some were not even aware of hand sanitizer and its use. A respondent who was not aware of hand sanitizer expressed preference for and satisfaction with ordinary hand washing:

> I do not know about it. I do not think hand sanitizer should take the place of regular hand washing. No other method of personal hygiene is beyond regular hand washing. Regular hand washing is the best (IDI/62 years/Mobil).

Those who were aware of it acknowledged the role played by various organisations in creating the awareness. A respondent described the involvement of his church in the distribution of free sanitizers in the following words:

> Our church members who are nurses also gave us hand sanitizer. They gave me for free. They asked us to use it to cream our hands whenever we want to leave the house. They gave it to my children too. I do not know may be it is available in my area (IDI/42 years/Agbowo).

Discussion

Participants in this study were aware that human activities that relate to hunting, camping, and direct contact with bats, monkeys and gorillas increase the potential ways of Ebola transmission [11]. Participants were also aware that human-to-human transfer of the virus occurs when there is direct contact with blood and body fluids such as sweat and saliva of the infected persons [13]. However, despite the awareness, the practice of Okada commuting two or more passengers in addition to the rider persisted during the EVD outbreak in Nigeria. Presence of skin diseases [41] and contact with corpses that died of the virus [10] were found to predispose people to contracting the disease.

Information on body contact was wide spread. Some certain public activities and cultural practices that involve body contact were suspended or modified. Theresa *et al.* [22] observed that people were more 'careful, gentle and disciplined' to exercise patience especially while on queues in public places such as banks, schools and hospitals due to the fear of contracting Ebola. The practice of handshaking and hugging, which are important aspect of social life especially among the youths in Nigeria, drastically reduced during the disease scenario [22, 27, 42]. A pilot online study conducted in Nigeria, Liberia, and Sierra Leone between 19 September

and 6 November 2014 revealed that majority (76%) of the people interviewed in Nigeria believed that the major way of contracting Ebola was contact with bodily fluids. Same position was maintained by 87% in Liberia and 89% in Sierra Leone [43]. The people's perception emphasises the level of intensity of the effects of the disease in terms of its fatality. In the three countries of RIWI and BioDiaspora [43] study, public awareness was high on the means of transmission of EVD. However, a slightly higher level of awareness was recorded in Liberia and Sierra Leone, perhaps, because the two countries were the worst hit.

Direct contact with infected persons' clothing materials, animals and sea foods was identified a possible route of transmission of EVD by the participants in this study. As protective device against accident, Okada riders provide helmet to passengers; passengers on Okada emphasized the use of nylon to cover head before wearing helmet. A study conducted by Oregon State University reported the possibility that tropical fish transported from the stressful environment can cause bacterial infections, and diseases which are transferrable to humans was reported by Mail Reporter. Some of the fish-caused diseases that affect humans are pseudomonas which can lead to septic shock when getting to open wound, and staphylococcus which can cause sickness and diarrheal in humans [44]. Whereas the perception that Ebola virus can be spread through fish was shared by the participants in this study, the Centre for Disease Control and Prevention (CDC) had established that Ebola virus cannot be spread through water or by food as no other species apart from humans, bats, apes, and monkeys have the ability to contract and spread the virus [1]. It was also affirmed that the spread of the virus through sexual intercourse (including oral sex) is widely unknown, even though the survivors of Ebola victims were encouraged to abstain from sex for 3 months or alternatively used condom for precaution [1].

Consumption of bush meat was emphasized by respondents as a major route of contracting EVD than the process of killing bushmeat. CDC maintained that Ebola is not only spread by foods such as the meat itself but the hunting, butchering and bush meat processing can bring people in contact with the virus through blood and other fluids of infected animals [1]. Binniyat [45] documented that the Kaduna Doka Bush meat market, which specialised in supplying to Abuja, Nasarawa and Plateau states smoked antelopes, pythons, and crocodiles among others witnessed low patronage [45]. It is important to make the distinction that not all forms of bushmeat can potentially transmit, EVD, certainly not snakes, fowl and crocodiles.

Avoidance of bush meat consumption can actually promote a positive response to human environment. Perspective from ecological model significantly implies that discouragement of bush meat can boost biodiversity conservation in Nigeria since bush meat hunting poses a great threat to biodiversity conservation in Africa [46, 47]. However, since a group of people earns a living from hunting bush meat, its discouragement may also bring about economic hardship to some rural and peri-urban dwellers.

In addition, the virus does not spread through cough or sneeze as believed by some respondents. This perception raises a concern about the quality of the information that the public receive about the disease. Such wrong information could be responsible for the spread of EVD. In the preventive information provided by WHO and CDC, it is clarified that Ebola virus is not airborne [1]. The World Health Organization warns that one of the easiest ways for health workers to contract Ebola is through contaminated surfaces or materials such as clothing and bedding [10]. This confirms the belief held by the respondents that clothes contaminated by the virus can spread the disease. Indiscriminate contact with animals, especially fruit-eating animals, and consumption of sea foods were also perceived to predispose people to contracting the EVD. Wrong information is possible when community health workers do not have adequate knowledge. It was observed by Anja-Wolz's [48] in another context also that some community health care workers were unable to recognize EVD despite the training they had received. Also, the influence of role model in religious institutions may affect people's perception about prevention and delay in seeking

appropriate treatment for EVD. For instance, in August 2014, during the yearly convention of The Redeemed Christian Church of God, the General Overseer led a prayer to seek God's intervention; for God to destroy the 'demon' Ebola in Nigeria (*Dovetv* n/d). Such belief, raised by a respected religious leader in the country, can influence perception of EVD especially when people do not have adequate knowledge.

One effective way to protect against contracting EVD is through regular hand washing [1]. In the 2008, the United Nations declared 15 October each year as 'Global Hand washing Day'; the decision was motivated by the record of the effectiveness of hand washing in preventing the spread of virus and bacteria such as diarrhoea and other respiratory tract infections, especially among children, [49, 50]. The practice of hand washing is not new in Nigeria. However, its proper practice was. Before it was formally launched by the Nigerian government in 20 May 2008 [51, 52], only 13% of Nigerians follow the best practice of hand washing regularly [53]. The findings of this study showed that the government at all levels, NGOs and other voluntary organisations promoted information about hand washing as a prevention method against Ebola. However, the information did not adequately motivate people to practice proper hand washing. Curtis, Caircross and Yonli [54] identified five junctures in which washing hands with soap or any other cleansing agents is crucial. The five junctures, according to the authors, are after cleaning a child's bottom, after defeacation, before preparing food, before feeding a child and before eating.

The transmission of EVD through close person-to-person contact between motorcycle–taxi drivers and passengers can also be avoided. This is possible in a restriction situation of a motorcycle–taxi driver to a passenger and with adequate space allowed between them, while protective wears are used to prevent direct contact. Lessons can also be drawn from the current Ebola outbreak in the north-eastern provinces of the Democratic Republic of the Congo. There have been reports of motorcycle taxi drivers identifying potential patients among their patients and bringing them to the Ebola Treatment centres [55]. In addition the Ebola Response Team envisioned a broader educational role for the motorcycle taxis, which are the main means of transportation for people in the city of Beni. The drivers are becoming involved in raising public awareness about EVD [56].

Conclusions

This study examines the behavioural patterns and perceived beliefs of people about the insurgency of EVD. The data used in this qualitative study were obtained from a small sample size of participants but maintain a balance in the interpretation. It is concluded that the potential of sociocultural practices, such as handshaking and hugging, as driver for transmission of EVD may influence the perception of motorcycle–taxi riders in the prevention and containment activities in Nigeria. Hence, understanding people's perception on handwashing practices, hugging and butchering of bushmeat should be given priority in designing programmes of EVD prevention and control in Nigeria. Neglecting precautionary measures set by international bodies in health and disease areas due to people's attitude will have negative effects on people and the society. Adherence to cautions should not be only practised during an epidemic outbreak but also before such outbreak is pronounced and after the containment. Appropriate and quick response to epidemics is required in subsequent disease outbreak control; this should not be delayed in any way as it was during the last major EVD outbreak. An exhaustive mapping of motorcycle–taxi routes could help understand contact networks at different spatial scales, population mobility patterns and in the management of future outbreaks. This study recommends that serious and aggressive campaign and teaching on hand washing should be carried out in all nooks and crannies of the country. People need to be properly oriented to ensure change of attitude to general health issues, not only Ebola resurgence. This is necessary for preventing other infectious diseases in Nigeria. There is need for policy response towards disease containment in Nigeria to reinforce global efforts.

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Conflict of interest statement

None declared.

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