



Qualitative Exploration of Ebola Risk Perception among Mortuary Workers in Ibadan Metropolis, Nigeria

Helen Ngodoo Adamu^{1*} and Mike Aneshimi Lawani¹

¹Department of Epidemiology and Medical Statistics, Faculty of Public Health, University of Ibadan, Oyo State, Ibadan, Nigeria.

Authors' contributions

This work was carried out in collaboration between both authors. Author HNA designed the study, performed the statistical analysis, wrote the protocol and first draft of the manuscript. Author MAL managed the analysis of the study and the literature searches. Both authors read and approved the final manuscript.

Article Information

DOI: 10.9734/AJRID/2018/v1i113944

Editor(s):

(1) Dr. Bobby Joseph, Professor, Department of Community Health, St. John's Medical College, Bangalore, India.

Reviewers:

(1) Oti Baba Victor, Nasarawa State University, Nigeria.
(2) Y. J. Peter, University of Abuja, Nigeria.

Complete Peer review History: <http://www.sciedomain.org/review-history/25333>

Short Communication

Received 14th April 2018
Accepted 22nd June 2018
Published 29th June 2018

ABSTRACT

Aim: To explore the risk perception of Ebola virus disease (EVD) among mortuary workers in Nigeria.

Study Design: A qualitative research approach method, using Focus Group Discussions (FGDs), conducted among 36 mortuary workers in Ibadan.

Place and Duration of Study: This study was conducted between October and November 2014 in Ibadan, Oyo state, Nigeria.

Methodology: A structured moderating approach with a non-directive style was developed. A Focus Group Discussion (FGD) guide was used to explore participants' ideas and opinions. The FGD guide consisted of five sections. Each section was framed to probe into the following issues: (1). Knowledge of EVD (2). Participant's attitude to EVD (3). Adherence to infection control practices (4). Risk perception of EVD; and (5). Behavioural predisposition to the risk of mortuary-related infections. A total of six FGD sessions were conducted among 36 mortuary attendants, drawn from

*Corresponding author: E-mail: adamuhelen66@yahoo.com;

two government and four private health facilities in Ibadan. Six participants made up each focus group and one focus group discussion was conducted at a time in the respective health facilities.

Results: The qualitative exploration of mortuary workers revealed gaps in the knowledge of workers with regards to EVD, the high-risk perception of mortuary workers to Ebola virus disease and the unavailability of PPE in conducting autopsies and daily operations. In addition, a poor attitude to convalescent individuals and certain harmful behavioural practices in the morgue were revealed as key findings.

Conclusion: Efforts at bridging the knowledge gaps concerning EVD among mortuary workers should be sustained, despite the decline in Ebola outbreaks. It is also recommended that standard precautions should be followed when handling corpses due to the risk of infection.

Keywords: Ebola viral disease; FGD; risk perception; mortuary workers; Ibadan.

1. INTRODUCTION

Ebola virus disease (EVD) is a fatal disease, with almost 90% fatality [1,2]. The 2014 EVD pandemic affected West African countries, like Sierra Leone, Liberia and Guinea [3]. Bouts of the disease outbreak were also recorded in Nigeria before the country was certified free of the disease on the 21st of October 2014, by the World Health Organization [4,5]. In spite of this certification, Nigeria still remains at risk, due to the ongoing Ebola epidemic within neighbouring West African countries [4]. The 2014 EVD outbreak is the largest outbreak on record with over 25,000 suspected cases and 10,301 deaths recorded so far [6,7]. More than 494 health workers have died while treating Ebola patients [6,8].

Mortuaries are a potential source of Ebola infection, posing occupational risks due to the hazards involved in handling dead bodies that might be on the verge of decay or contamination [9]. In most developing countries, mortuaries are underdeveloped and understaffed, with lack of funds and other infrastructural resources placing a lot of strain on their operations [9,10]. Like other health workers, mortuary workers are at risk of contracting EVD due to associated occupational risks [11]. Several reports have documented diseases contracted by mortuary workers during the washing, dressing and embalming processes [9,12,13]. Cultural practices like risky burial rites, washing and touching of dead bodies were shown to be responsible for about 60% of EVD cases in Guinea [14]. Similar practices were also reported as the main source for the transmission of EVD in Gabon, Uganda and Sierra Leone [15]. In Sierra Leone, for instance, 365 Ebola deaths were linked to the single funeral ceremony of a famous traditional healer [16].

Peoples' perceptions are importantly influential on preventive practices [10]. Knowledge of risk perception is even more useful in developing communication messages that enhance the peoples' understanding of a disease, which in turn increases the public's support for the control of the disease [15,17]. Studies have shown that the risk perceptions for viral hemorrhagic fevers are high, especially when people witness outbreak. Therefore, adequate adherence to infectious disease control practices is key to the prevention of infection in health facilities [18]. There is a dearth of data regarding the risk perception of Ebola virus disease among mortuary workers in Nigeria. Hence, this study was aimed at exploring Ebola risk perception among mortuary workers in the Ibadan metropolis.

2. METHODOLOGY

2.1 Study Design

This is a qualitative explorative study using focus group discussions conducted among mortuary attendants in the Ibadan metropolis of Oyo state.

2.2 Study Area

Ibadan, the capital of Oyo State, is located in the southwestern part of Nigeria. It lies approximately on Latitude 7°22' north of the Equator and 3°53' east of the Greenwich meridian. Ibadan is administratively classified into five urban and six semi-urban local governments [19]. Oyo State has 33 local government areas with an estimated population of 6,169,719.00 persons [20]. Oyo State shares a border with Ogun State in the south, Kwara State in the north, and is partly bordered in the West by Ogun State and the Republic of Benin [21].

2.3 Study Population

The study population includes mortuary workers in private and government-owned health facilities within the Ibadan metropolis. The health facilities included in this study were two public health facilities (Adeoyo Maternity Hospital and University College Hospital, both in Ibadan) In addition, four (4) private health facilities (Oluyoro, Eleta, Grace and Jonfem health facilities) were included in the study.

2.4 Sampling Technique

Ibadan has a limited number of mortuary attendants. A total of six FGD sessions were conducted among thirty-six (36) mortuary attendants, drawn from two government and four private health facilities in Ibadan. Six (6) participants made up each focus group and one FGD was conducted at a time in the respective health facilities. A letter of Introduction and ethical approval for the study was served to each of the heads of the six health facilities to obtain permission.

2.5 Inclusion Criteria and Exclusion Criteria

Eligible participants were approached individually and briefed accordingly about the focus group participation. Mortuary attendants who had been working at the morgue for, at least, three months from the day they were approached were deemed eligible for the study. Some participants were reached by phone call. If they agreed, consent was obtained and information about the meeting venue and time was appropriately disclosed. During the contacting, no female mortuary worker was identified, hence the homogeneity of the study with regards to gender. Mortuary workers who refused to give consent were excluded from the study.

2.6 Methods and Instruments for Data Collection

This study was conducted between October and November, 2014 among mortuary attendants in Ibadan, Oyo State, Nigeria. A structured moderating approach was developed alongside a non-directive style Focus Group Discussion (FGD) guide, which was used to explore participants' ideas and opinions. The FGD guide consisted of five sections. Each section was framed to probe into the following issues: (1).

Knowledge of EVD (2). Participant's attitude to EVD. (3). Adherence to infection control practices (4). Risk perception of EVD; and (5). Behavioural predisposition to the risk of mortuary related infections. Prior to the FGD, forms containing participants' demographic information were completed by discussants. These forms were coded to correspond with alphabets worn by individual participants during the discussion. The completed forms were securely stored and accessible only to the researchers. The participants were further assured that written reports would not include names and that recorded information would not be shared outside the research team. Participants were reminded of the team's responsibility to guard the confidentiality of the discussions. Discussants were also made to understand that there were no right or wrong responses. All opinions were well received during the discussions.

The content validity of the guide was ensured, using pertinent variables teased out from related literature reviewed. Individual input, as well as suggestions from experts in related fields, was used to enhance the face and content validity of the guide. The FGD guide was translated into Yoruba, the predominant language spoken in Ibadan and later back to English to ensure that the instrument maintains its originality. The FGD guide was pretested among two groups of mortuary workers of both government and privately owned health centers offering mortuary services in Lagos, which has a similar social and environmental setting with Ibadan, to determine the reliability of the guide.

2.7 Data Collection Procedure and Analysis

The FGD sessions were conducted between the hours of five and seven PM. Each FGD session lasted 58 minutes, on the average. Each of the FGD sessions was recorded with an audio recording device and facilitated by a moderator, a note-taker and an observer. The moderator asked the questions and used the FGD guide to facilitate and probe into the different ideas and opinions of the discussants. Clarifications were made where necessary to guide the discussion. The note-taker took notes of each participant's contribution quickly and unobtrusively, and a good audio recorder was used to record the discussions to prevent the loss of important information. The observer took note of subtle attitudinal expressions, gestures and useful non-verbal cues among discussants.

Before the commencement of each session, the moderator introduced the members of the team and the purpose of the discussion and obtained verbal consent to record the discussion on an audio recording device from each participant. Where it happened that a participant failed to consent to the use of a recorder, the note-taker efficiently captured the ideas and opinions of the discussants, as clearly stated. The discussants were assured that expressed opinions would be kept confidential, so they were encouraged to freely express their views. Sessions were as flexible and friendly as possible with a view to drawing out points that were not necessarily captured in the guide. Mild refreshment was served to motivate discussants.

The discussion on the audio recorder was replayed and carefully transcribed into a notebook by the note-taker and written as a report, which was analyzed, thematically. Ideas which reflected concurrence and disagreement, as stated by participants were noted and presented.

2.8 Ethical Consideration

Ethical clearance for this study was sought and provided by the Oyo State Research Ethics Committee of the Ministry of Health, Ibadan. Permission was also sought from the management of the private mortuaries and from the public hospitals. Individual consent was sought from participants in this study and confidentiality maintained.

3. RESULTS AND DISCUSSION

A total number of 48 mortuary attendants were sampled for the study. However, only 36 persons consented to participate in the FGD. Eight declined to give consent to participate, while four (from the public health facilities) were delisted on the bases of not meeting the inclusion criteria. There were six FGDs conducted among the 36 mortuary attendants, six (6) participants across six focus groups. The mean age of the participants was 38.14 (range 29-56). (Table 1).

3.1 Knowledge of Ebola Viral Disease (EVD)

Overall awareness of the severity of Ebola disease was very high. Almost all the participants had sufficient knowledge of EVD, especially regarding its causes and symptoms. All six groups agreed that Ebola is a deadly disease

which is reflected in the comments given below, such as:

“Ebola is a deadly disease . . . the fact that there is no known cure for it shows how terrible and deadly the disease is. I pray we would [sic] not be infected”.

“According to what people say all over the world, people proclaim Ebola to be a very serious and deadly disease that no one can play with and if we see anyone with this disease, we should run away totally from that person”.

Table 1. Facility-wise age stratification of participants (n=36)

Type of health facility	Age range Years	Mean age years
Public health facility	30-42	37
Public health facility	40-56	47.1
Pivate health facility 1	32-45	38.5
Pivate health facility 2	32-45	37.6
Pivate health facility 3	29-40	34.5
Pivate health facility 4	31-40	36
Total	29-56	38.1

Of the six groups, five had sufficient knowledge of EVD, its causes and symptoms. Most of the respondents mentioned radio, television and health seminars as their sources of information. Some of their comments on the ways in which they got enlightened about EVD are stated below:

“We were told through health seminars that a certified Ebola patient must not be hand shaken [sic]. Any fluid from such a patient like sweat, blood, urine must not touch another person, not even eating with such a person”.

“I don’t know much about Ebola, I just heard of it from the radio station”.

A brief probe into the various possible treatment options revealed that all the groups, except one, believed that western treatment was a better alternative than traditional medicine in managing cases of Ebola. Participants responded as such:

“I am a Yoruba man and I believe so much in orthodox treatments but the white man’s medicine appears to be more potent for Ebola patient, because some were treated in

Lagos where they built camps for treating Ebola patients and all of those sick with the disease are totally okay now from what we heard in the news. Among them was the nurse that welcomed Patrick Sawyer; she survived it"

"Traditional medicine would work on Ebola if it is allowed to be tested [sic] on Ebola patients by our traditional doctors. The concern I have is that the government would not allow such initiative [sic] to be carried out".

Although all the groups were well informed about the symptoms of EVD, some of their perceived symptoms were misconstrued. The most frequently mentioned symptom was bleeding from the nose, as reflected in the comment below:

"I have heard that people with Ebola bleed through the nose and mouth and urinate blood due to the severity of the Ebola infection in the body".

Participants seemed to be well acquainted with necessary precautionary measures, as respondents cited frequent washing of hands, use of hand sanitizers and observing good personal hygiene practices. Surprisingly, the idea of bathing with salted water as a precaution against EVD was popular in one group. One of the most striking comments was:

"I believe that bathing with salted water would prevent someone from having Ebola, I and my family did it when the news of the outbreak was growing wild [sic]"

3.2 Risk Perception Regarding EVD

Participants across the six groups seemingly had high perceived risk regarding EVD and expressed a fear of contracting it due to job associated risks. Several of them expressed much gratitude for the early warning adverts and seminars conducted by the state ministry of health and other affiliated non-governmental organizations, to enlighten them about the disease. Participants' feelings were expressed thus:

"The type of work we do is very dangerous, a different type of corpses are being brought into mortuary almost on a daily basis without knowing its [sic] primary cause of death"

"This job we do exposes us to different kinds of disease, even the Ebola we've just talked about now, if we do not take [sic] heed to proper embalming procedures or follow every necessary step to protect ourselves. I tell you, this job allows us to be exposed and afflicted by different diseases"

However, some participants had mixed reactions on the possibility of contracting infections if they adhere to universal control practices. Some said:

"Anyone who does not take care of himself early enough is capable of being infected by any disease that comes with a corpse. For me, I cannot contract Ebola through any corpse because, to the best of my ability, I use to [sic] take care of myself all the time".

"I don't believe I can contract any disease through the mortuary job I do because from the senior medical officer to our most senior worker in this unit, I have not heard of any of them being sick as a result of this job we do, therefore, likewise, we junior workers cannot contract any disease".

"I'm afraid of Ebola so much that when we heard of it (at first), we were so afraid to the extent that we no longer shook each other [sic] hands like we normally do when we resume duty every morning; we avoided each other for a very long time"

"Ebola can be contracted through a corpse. Besides, I hear all sorts of news about the disease and I am very worried because of the kind of job I do. We seriously pray against the disease hoping that God will bring a lasting cure for this deadly pestilence".

A cross-examination of participants brought to light, again, diverse interesting positions based on the participants' impressions concerning eventualities that could necessitate the handling of a corpse, presenting Ebola-like symptoms. An additional probe into how they might relate with convalescent patients in public health facilities was quite satisfactory as opposed to the opinions of their counterparts in private health facilities. Opinions were expressed by discussants thus:

"I will run for my dear life if I get to know that someone who has died of Ebola has been brought into our facility. The disease is deadly and I heard it can be contracted"

through the air, which means danger to anybody”

On the question of the cause of Ebola, a participant responded thus:

“Going by the religion I practice, I strongly believe that Ebola is a punishment from God, venting his annoyance on mankind.”

3.3 Behavioral Risks that Predispose to EVD Infection

Most participants claimed that they use protective gear in their places of work. Although, a few from public health facilities spoke severally about insufficient protective equipment and gear, and how they were forced to buy the protective gear by themselves due to this insufficiency. Typical responses were:

“We were never given any protective wear at all, we improvise by ourselves. We don’t even protect ourselves when we are carrying out a task that is not too serious in the mortuary”.

“Personally, I don’t have an apron not even a nose mask for protection. We were not given by our management team, but there is this cloth-like apron commonly used in our mortuary to cover ourselves when working”.

“Nothing should stop me from performing my duties of washing and embalming any corpse brought into our facility. I think what I need is absolute carefulness. Once I am well covered with rubber clothes, then I should have no fear”.

Eating in the morgue was identified as a practice among some participants. Of the six groups, one group reported eating and occasional cooking as a common occurrence in the mortuary during normal working hours. One participant commented:

“We buy food from hawkers that come around and we eat while we are at work, we cook in the morgue at times, if such condition warrants [sic]”.

In response to questions on cultural practices that promote Ebola Virus Disease. Five out of the six groups opined that eating bush meat or improperly cooked food could lead to an infection.

“We were told not to eat bush meat, if people still eat it or do such thing [sic]; Ebola could come into our society”.

Another opinion:

“I don’t believe someone could [sic] contract Ebola through eating bush meat, because people have been eating bush meat long before now, even during the time when the outbreak was still very hot, people were eating bush meat here, i ate too, and nothing happened afterwards. We heard Bats and Monkeys can transmit the disease yet some people have those monkeys in their homes as pets and they’ve not had Ebola at all”.

3.4 Adherence to Infectious Disease Control Practices

The three out of the six groups reported good adherence to infectious disease control practices. Quotations from FGD participants portraying their opinion are documented below:

“we use our PPE at all times, for instance the double gloves mentioned are worn, because, putting on just one, there could be a risk of tear when working.”

“It is compulsory for us to wear PPE because we mix up [sic] with people at home and other public places after leaving the mortuary”.

The most frequently cited PPE that were commonly used among participants were the ‘hand gloves’ and ‘nose mask’. Routine seminars on how to handle corpses and adherence to universal preventive measures were mentioned across the groups; however, there were differences in the regularity of attendance due to the fact that the secondary health facilities had seminars twice in the current year.

This study has shown that there is some improvement in the knowledge of health workers regarding Ebola which is similar to quantitative findings in Nigeria [22,23,24,25]. However there is a need for improvement, as regards messages on the transmission routes of the diseases and preventive practices, this is because incorrect practices such as, bathing with salt water as a way to prevent EVD, were still mentioned in the FGD sessions.

In addition, myths and norms pertaining to traditional medicine were considered, by some, as the best cure for Ebola. Also, the notion that Ebola can be transmitted through the air still needs to be dispelled.

There was a poor attitude towards individuals that have recovered from Ebola. This is, most likely, due to misinformation regarding EVD, compounded by an unhealthy fear of the disease. This negative attitude is similar to findings of studies conducted within communities in Nigeria [22] but different for the multi-site study [24]. The erroneous belief that EVD is still contagious even after an individual makes a full recovery is still prevalent among respondents in this study hence, the poor attitude. The practice of cooking and eating in the mortuary, as mentioned by some participants, is a risky behaviour. This is a dangerous trend which can lead to grave consequences. The exposure of cooking items and cutlery in the morgue can lead to hospital-acquired infections.

The risk perception of mortuary workers with regards to EVD was high. This finding is equally apparent in local quantitative studies conducted within Nigeria, a high-risk perception among health workers [26]. However, most of the groups in this study believed that they were not at risk of contracting infectious diseases. This may be based on a reasoning process that encourages them to think that the deadly virus is not a real threat, resulting in a 'self-exempting' optimistic bias [27]. Understanding community views and responses to Ebola outbreak is important as this would lead to effective planning and guide community participation [17,28]. Community perceptions of Ebola can reduce or escalate the spread of the disease. In light of the epidemic, messages relayed on how to modify cultural practices and behaviours, such as minimizing touching the dead bodies of loved ones and embalming in order to prevent the spread of the disease are important [29]. Corpses are potentially infectious; therefore standard precautions should be followed when handling them.

3.4.1 Strength and weakness of the study

This study has its limitations in that the sampling size acquired for the study was small, due to the low number of people practising this occupation in Ibadan. Secondly, the lack of female mortuary workers in this study revealed that it is a male-dominated profession.

3.4.2 Strengths and weaknesses in relation to other studies

There is a dearth of studies conducted among mortuary workers on safety and precautions regarding Ebola virus disease, and this study explored the ideology of the participants, and views and opinions on EVD that could not have been fully captured by a quantitative study.

3.4.3 Unanswered questions and future research

Further studies can focus on the interaction of religion, cultural practices and traditional rites in relation to embalming procedures. Secondly, an explorative study can be conducted on the knowledge of EVD, after a pre and post training assessment of mortuary attendants.

4. CONCLUSION

The high awareness of mortuary workers regarding Ebola virus disease found in this study is linked to information gotten from the mass media (radio and television). The mass media remains the most widely used and accessible means of information, especially at the level of the community. The erroneous belief about the use of salt water as a preventive measure, and misconstrued information about symptoms of Ebola, and routes of transmission demonstrate the need for educational campaigns through seminars, pamphlets, and workshops in bridging knowledge gaps. Also, despite the recent decline in Ebola outbreaks, health messages and campaigns should be sustained, as this would not only increase the awareness of the risk of Ebola but also correct the identified wrong beliefs and bring about appreciable improvement in the perception of the disease.

Death certificates should be issued by relevant authorities to provide embalmers and mortuary attendants with information about the cause of death and subsequently, taking appropriate precautionary measures. This is due to the exposure risk posed due to the nature of their jobs. The harmful behavioural practices of discussants in this study, such as eating and cooking in the morgue, pose a very serious risk to mortuary workers. Programs integrating risk communication and behavioural risk modification should be provided to bridge gaps in knowledge. There is a need for health authorities to organize practice-oriented training programs on infectious disease control practices and preparedness for

mortuary attendants and embalmers on a regular basis.

CONSENT

As per international standard or university standard, patient's written consent has been collected and preserved by the author(s)

ETHICAL APPROVAL

The authors hereby declare that this research has been examined and approved by the Oyo State Research Ethical Review Committee and it has therefore, been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Feldmann H, Geisbert TW. Ebola hemorrhagic fever. *Lancet*. 2011; 377(9768):849–862. DOI: 10.1016/S0140-6736(10)60667-8
2. Hartman AL, Towner JS, Nichol ST. Ebola and Marburg hemorrhagic fever. *Clin Lab Med*. 2010;30(1):161–177. DOI: 10.1016/j.cll.2009.12.001
3. Fasina FO, Shittu A, Lazarus D, Tomori O, Simonsen L, Viboud C, Chowell G. Transmission dynamics and control of Ebola virus disease outbreak in Nigeria, July to September 2014. *Euro Surveill*. 2014;19(40):20920.
4. WHO. Nigeria is now free of Ebola virus transmission. WHO Media center. Available:<http://www.who.int/mediacentre/news/ebola/20-october-2014/en/> (Accessed 24 May 2018)
5. Out A, Aeh S, Osifor-Dawodu E, Alade E, Ekuri S, Idris J. An account of Ebola virus disease outbreak in Nigeria: Implications and lessons learnt. *BMC Public Health*. 2017;18(1):3. DOI: 10.1186/s12889-017-4535-x
6. WHO. Ebola Situation Reports. Available:<http://apps.who.int/ebola/ebola-situation-reports>. (Accessed 19 March 2017)
7. Bah EI, Lamah MC, Fletcher T, Jacob ST, Brett-Major DM, Sall AA, Shindo N, Fischer WA, Lamontagne F, Saliou SM, Bausch DG, Moumié B, Jagatic T, Sprecher A, Lawler JV, Mayet T, Jacqueroz FA, Méndez Baggi MF, Vallenás C, Clement C, Mardel S, Faye O, Faye O, Soropogui B, Magassouba N, Koivogui L, Pinto R, Fowler RA. Clinical presentation of patients with Ebola virus disease in Conakry, Guinea. *N Engl J Med*. 2015;372(1):40–47. DOI: 10.1056/NEJMoa1411249
8. Lancet T. Ebola: Protection of health workers on the front line. *The Lancet*. 2014;384(9942):470. DOI: 10.1016/S0140-6736(14)61319-2
9. Sharma BR, Reader MD. Autopsy room: A potential source of infection at work place in developing countries. *Am J Infect Dis*. 2005;1(1):25–33.
10. Nyaberi JM, Kakai R, Obonyo CO, Othero D. Perceived occupational risk of infection among hospital mortuary attendants in Nyanza Province, Kenya. *Int J Innov Res Stud*. 2014;3:487–498.
11. Ogunnowo B, Anunobi C, Onajole A, Odeyemi K. Exposure to blood among mortuary workers in teaching hospitals in south-west, Nigeria. *Pan Afri Med J*. 2012;11(61). Available:<http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=3343689&tool=pmcentrez&rendertype=abstract>
12. Nwanyanwu OC, Tabasuri TH, Harris GR. Exposure to and precautions for blood and body fluids among workers in the funeral home franchises of Fort Worth, Texas. *Am J Infect Control*. 1989;17(4):208–212.
13. Babatunde O, Charles A, Adebayo O, Kofoworola O. Exposure to blood among mortuary workers in teaching hospitals in south-west, Nigeria. *Pan Afr. Med. J*. 2012;29:11(61). DOI: 10.11604/pamj.2012.11.61.1473
14. Pourrut X, Kumulungui B, Wittmann T, Moussavou G, Délicat A, Yaba P, Nkoghe D, Gonzalez JP, Leroy EM. The natural history of Ebola virus in Africa. *Microbes Infect*. 2005;7(7-8):1005–1014. DOI: 10.1016/j.micinf.2005.04.006
15. Lamunu M, Lutwama JJ, Kamugisha J, Opio A, Namboozee J, Ndayimirije N, Okware S. Containing a haemorrhagic fever epidemic: The ebola experience in Uganda (October 2000–January 2001). *Int J Infect Dis*. 2004;8(1):27–37. DOI: 10.1016/j.ijid.2003.04.001
16. WHO. Sierra Leone: A traditional healer and a funeral.

- Available:<http://www.who.int/csr/disease/ebola/ebola-6-months/sierra-leone/en/>
(Accessed 19 March, 2017)
17. Hewlett BS, Amola RP. Cultural contexts of Ebola in Northern Uganda. *Emerg Infect Dis.* 2003;9(10):1242–1248.
DOI: 10.3201/eid0910.020493
 18. Abdulraheem IS, Amodu MO, Saka MJ, Bolarinwa OA, Uthman MMB. Knowledge, awareness and compliance with standard precautions among health workers in North Eastern Nigeria. *J Community Med Health Educ.* 2012;2(3).
DOI: 10.4172/2161-0711.1000131
 19. Olawuni OP, Popoola AS, Bolukale AT, Eluyeke KP, Adegoke JO. An assessment of the factors responsible for flooding in Ibadan metropolis, Nigeria. *J Env Earth Science.* 2015;5(21):1-5.
 20. Nigeria data portal. National bureau of statistics, Nigeria.
Available:<http://nigeria.opendataforafrica.org/xspplpb/nigeria-census>
(Accessed on 24 May)
 21. Oyo. The Official website of Oyo state.
Available:<https://oyostate.gov.ng/>
(Assessed on 24 May).
 22. Muhammad-Idris ZK, Ejembi CL, Abubakar AA, Bashir SS, Ahmadu L, Kera HN, Esekhaigbe C, Adagba KO. An assessment of knowledge, attitude and perceived risk of Ebola virus disease (EVD) among rural dwellers in Northern Nigeria. *Sub-Saharan Afr J Med.* 2016; 3:199-204.
 23. Center for Public Policy Alternatives (CPPA). Study on the Ebola Virus Disease (EVD) Knowledge, Attitudes and Practices of Nigerians in Lagos State-Survey Report. Lagos. CPPA. 2014;8-29.
Available:<http://cpparesearch.org/wp-content/uploads/2015/01/Knowledge-Attitude-Practices-of-Nigerians-on-the-EVD-Survey-Report-2014.pdf>
(Accessed 24 May, 2018)
 24. Alhaji NB, Yatswako S, Oddoh EY. Knowledge, risk perception and mitigation measures towards Ebola virus disease by potentially exposed bushmeats in north-central, Nigeria: Any critical gap? *Zoonoses Public Health.* 2018;65(1):158-167.
DOI: 10.1111/zph.12384
Epub 2017 Aug 3.
 25. Iliyasu G, Ogoina D, Out AA, Dayyab FM, Ebenso B, Otokpa D, Rotifa S, Olomo WT, Habib AG. A multi-site knowledge attitude and practice survey of Ebola Virus Disease in Nigeria. *PLoS One.* 2015;10(8): e0135955.
DOI:10.1371/journal.pone.0135955.ecollection 2015
 26. Ajayi NA, Ojide CK, Ajayi IA, Ukwaja KN. Evaluation of clinicians' reporting proficiency and their risk perception of Ebola virus disease in Ebonyi state, Nigeria. *Germs.* 2017;7(3):140-148.
 27. Bränström R, Brandberg Y. Health risk perception, optimistic bias, and personal satisfaction. *Am. J. Health Behav.* 2010; 34(2):197–205.
 28. Leach M. Haemorrhagic fevers in Africa: Narratives, politics and pathways of Disease and Response [WWW Document]. STEPS Cent. n.d.
Available:<http://steps-centre.org/publication/haemorrhagic-fevers-in-africa-narratives-politics-and-pathways-of-disease-and-response/>
(Accessed 19 March, 2017)
 29. USAID and Government of Liberia: Community perspectives about Ebola in Bong, Lofa and Montserrado Counties of Liberia: Results of a Qualitative study. Final Report; 2015.
Available:<https://f.hypotheses.org/wp-content/blogs.dir/2225/files/2015/02/HC3-Liberia-Qualitative-Report.pdf>
(Accessed on 19 March, 2017)

© 2018 Adamu and Lawani; This is an Open Access article distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Peer-review history:
The peer review history for this paper can be accessed here:
<http://www.sciencedomain.org/review-history/25333>