

Lassa fever prevention in Nigeria: A study of a multi-disciplinary mix of healthcare workers in a referral treatment centre in Nigeria

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KEYWORDS: Lassa fever, health care workers, knowledge, preventive practice, Ebonyi State Nigeria

ABSTRACT

Introduction: Healthcare workers (HCWs) are especially susceptible to Lassa fever (LF) due to the close contact they have with patients. Ebonyi State is endemic for Lassa Fever with recurrent outbreaks that have had catastrophic affectation on health workers constantly at risk of this infection. This study aimed to determine knowledge, attitude and practice toward Lassa fever prevention and control in a tertiary hospital in Ebonyi State Nigeria. **Methods:** This was a cross-sectional study carried out at the Alex-Ekwueme Federal University Teaching Hospital Abakaliki among 386 healthcare workers selected using a stratified random sampling technique. Proportionate allocation was used to select various disciplines and data was collected using semi-structured interviewer-administered questionnaires. Data analysis was performed using Epi-Info version 7.2. **Results:** Over half of the respondents were females (214/386, 55.4%) with a mean age of 38±6.8 years. The majority had good knowledge of clinical presentations, the transmission of Lassa fever and Lassa fever prevention and control (316/386, 81.9%). Respondents who had previous training IPC (infection prevention and control) training were 1.9 times (AOR: 1.9, C.I 1.07-3.37) more knowledgeable than others. There was good attitude towards Lassa fever prevention and control (369/386, 95.6%) among HCWs. However, only 28.2% (109/386) of the respondents had adequate preventive practices towards Lassa fever. Males (AOR: 0.4, C.I 0.27-0.72), HCW with tertiary education (AOR:0.4 C.I 0.23-0.83) and HCW who had contact with patients (AOR 0.4 C. I 0.26-0.68) were 2.5 times less likely to have good practice. HCWs with less than 10 years of working experience in the hospital were 1.6 times less (AOR 0.6 C. I 0.34-0.95) likely to have good practice to Lassa fever prevention. **Conclusion:** The knowledge and attitude towards LF prevention and control were good while the practice was poor. Sex, educational status, patient contact and health workers' years working in the facility were the factors associated with practice among them. To enhance LF preventive practices, we recommend the provision of protective devices, routine training and supportive supervision of health workers with a special focus on those prone to poor practices.

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Introduction

Lassa fever(LF) is an acute haemorrhagic fever of zoonotic origin first described in Nigeria in 1969 from the small town of Lassa in North-Eastern Nigeria where it gets its name [1-3]. It has become endemic to the country amongst other west African countries like Benin, Liberia, Ghana, Mali, Sierra Leone and the Gambia with an estimated 300,000 Lassa fever cases and about 5,000 deaths occurring yearly within the region [4-8]. Seasonal variations have been described with the occurrence and clustering of outbreaks around the late rainy seasons and early dry seasons.[3,4]. Transmission of the disease is by contact with contaminated excreta or secretions of infected multi-mammate rats *Mastomys natalensis* which is its natural host, however human to human transmission of the disease occurs through contact with blood or bodily fluids from infected persons [3,8]. Lassa fever has an incubation period of 3-21 days and with non-specific clinical manifestations like fever, fatigue, gastrointestinal symptoms (vomiting, diarrhoea, stomach ache), respiratory symptoms (cough, chest pain, dyspnoea), neurologic symptoms(disorientation, seizures, unconsciousness) and haemorrhaging making spread among healthcare workers more likely in a situation of poor adherence to strict infection prevention and control (IPC) practices [5,8,9]. Nigeria with its recurrent outbreaks of LF over the last two decades has shown major clustering of the cases occurring in Edo, Ondo and Ebonyi states [8]. With the challenges of diagnosis of Lassa fever in many health facilities across the country leading to delays in patient isolation and increased risk of transmission to healthcare workers and subsequently their families as was witnessed in the 2018 outbreak in Ebonyi state where healthcare workers of the Federal teaching hospital accounted for about 41% of the total infected HCW in the country [5].

Studies have been done on Lassa fever among different groups but little has been reported about the knowledge attitude and practice among HCWs despite repeated incidents of infection among them [5,10-13]. This study is aimed to determine the knowledge, attitude and Lassa fever preventive practice among healthcare workers in a tertiary hospital in Abakaliki and also the factors associated with the preventive practice.

Methods

Study area

This study was conducted at the federal teaching hospital Abakaliki a 720-bedded facility located centrally at Abakaliki, Ebonyi State capital South-East Nigeria. It offers specialist care and training of nursing, medical laboratory, medical students and resident doctors, it has attached to it a newly built virology centre which has a 25 bedded capacity, the only one within the southeast zone of Nigeria, it receives referrals from other neighbouring states [11,14].

Study population

Healthcare workers directly involved in patient care with the exclusion of health workers working at the virology centre

Study design

A descriptive cross-sectional study design was employed

Sample size and sampling

A sample size of 386 using a prevalence of 51% from the good practice level observed in a previous study, 95% confidence was used and this was proportionately allocated in accordance to the proportion from the different cadre of clinical healthcare workers who are directly involved with patient management [1]. They were stratified as follows doctors-27.7%, nurses-37.4, laboratory scientist-5.6%, physiotherapist-2.7, pharmacist-3%, potters-7.7%, orderlies-14.8%, mortician-1.2%.

Data collection methods and tool

Data was collected using a semi-structured interviewer-administered questionnaire with sections "A-E", section "A" sociodemographic, Section "B" Knowledge of LF, Section "C" Attitude towards LF preventive practice, Section "D" preventive practice of respondents, Section E availability of Personal protective devices.

Definition of variables

These include Knowledge, attitude and practice of LF which was self-reported. The knowledge of Lassa fever prevention and control was assessed with 23 structured questions. Correct answers were scored "5", incorrect answers were scored "0", for the question on a likert scale "5" was given for strongly agree, "4" for disagree, '3' for I don't know, '2' for disagree and 1 for strongly disagree. The scores were

summed up for each respondent and respondents that had 75% and above of the summed up score were considered to have good knowledge [15]. Attitude was assessed with 13 questions structured in a likert scale with a score of “5” for strongly agree, “4” for disagree, ‘3’ for I don’t know, ‘2’ for disagree and 1 for strongly disagree. The scores were summed up for each respondent and respondents whose scores were above 80% were considered to have good attitude [15]. Lassa fever prevention and control practices: these were assessed from 6 structured questions. Practice score of “5” for always use of personal protective devices, ‘4’ for ‘most time use of PPE’, ‘3’ for ‘sometime use’, ‘2’ for ‘rarely use’ and ‘1’ for never use. Lassa fever infection prevention and control were summed up as good practice for scores of greater than or equal to 75%, and poor practice for scores of less than 75%.[16] Independent variables: socio-demographic variables (sex, profession, designation, years of practice) as well as level of knowledge on infection prevention and control of Lassa, level of training Lassa fever or IPC, knowledge of Lassa fever prevention and control

Data management and analysis

Data were entered into Microsoft Excel 2016 cleaned and transferred EPI Info 7 for analysis. Lassa fever infection prevention and control were summed up and scores greater and equal to 100% were taken as good practice. The knowledge, attitude and practice categories were represented using frequencies and percentages in tables and charts. An odds ratio and confidence level were conducted to determine the association between dependent variables(sociodemographic infection prevention and control training) and knowledge attitude and practice of Lassa fever prevention and control. Multivariate logistic regression was conducted for the factors that were significant($p=0.05$) at the bivariate level.

Ethical considerations

Ethical approval was sought and obtained from the research and Ethics Committee of the Alex Ekwueme Federal University Teaching Hospital Abakaliki, Ebonyi State. Informed consent was obtained from each respondent before the administration of the questionnaire with confidentiality and data security ensured using a secured passworded laptop.

Results

A total of 386 healthcare workers responded to the questionnaire giving a response rate of 100% The mean age (\pm SD) of healthcare workers in FETHA was 38 ± 6.8 years with the majority of the study participants 354 (91.7%) over 30 years of age. Female respondents were slightly more 214 (55.4%) almost all the respondents were Christians 383 (99.2%), 319 (82.6%) of the respondents were married. Nurses made up the highest number of respondents 144 (37.3%). The majority of respondents were trained in Lassa fever infection prevention and control 282 (73.06%) and of them, 151 (53.6%) had their training within the last 1 year [Table 1](#).

All the respondents were aware of Lassa fever, 358 (92.6%) of all respondents had heard about Lassa fever at the hospital(through academic presentations and mortality reviews) and hearing from friends and family accounted for the least source of information [Figure 1](#).

Most of the respondents (376/386, 97.4%) knew that a virus was the causative agent of Lassa fever. Fever (368/386, 96.9%) was the most common symptom known by the respondents while the least known symptom was chest pain (163/386, 42.2%) [Table 2](#). A total of 316 (81.9%) of all the respondents had good knowledge of prevention and control practices of Lassa fever. Doctors were the most knowledgeable of Lassa fever prevention control practice at 96 of 107 doctors (89.7%). There was generally good attitude of respondents towards Lassa fever preventive practice with all the physiotherapists and morticians. Of all the respondents interviewed 277 (71.8%) showed poor practice toward Lassa fever prevention with doctors showing the highest level of poor practice [Table 3](#). Respondents who had Lassa fever IPC training (AOR 1.9, 95%CI:1.07-3.37 $p=0.028$) were twice more likely to have good knowledge than those who did not have the training [Table 4](#). There was no significant association between attitude and any socio-demographic characteristics. Males were (AOR 0.4, 95%CI:0.27-0.72 $p=0.001$) less likely to have good practice compared with females, respondents with tertiary educational were (AOR 0.4, 95%CI:0.23-0.83 $p=0.012$) less likely to perform

good practice compared to those whose highest educational status was secondary school or less, healthcare workers who had contact with patients were (AOR 0.4, 95%CI:0.26-0.68 $p < 0.001$) 2.5 times likely to perform safe practice compared with those who had not and HCW who has less than 10 years working in FETHA were (AOR 0.6, 95%CI:0.34-0.95 $p = 0.031$) 1.6 times less likely to perform safe practice than those who had more than 10 years working in FETHA [Table 5](#).

LF IPC training was a positive predictor of good knowledge while sex educational status patient contact and years working in FETHA were negative predictors of LF preventive practices

Discussion

With its ability to cause significant morbidity and mortality within a community and its ability to easily spread among health workers within the hospital, especially during outbreaks, Lassa fever is a disease of public health importance. In lieu of this, adequate knowledge which should translate to good infection prevention and control practices is vital in safeguarding the health of workers in a healthcare setting and the community at large. The Lassa fever awareness in our study was similar to what was obtained in other studies of health workers of private and government-owned primary healthcare facilities in Edo State and also a study conducted in Edo State and Ebonyi State in tertiary hospitals among the healthcare workers [\[17,18\]](#). The knowledge of Lassa fever in terms of epidemiology, clinical symptoms and prevention and control was high among respondents in this study. This finding was similar to a 2015 cross-sectional study done in a tertiary hospital located in Edo state which also records similar outbreaks and high endemicity of the disease. This is not surprising considering the recurrent outbreaks which have been recorded in the country for the last decades, especially in Ebonyi and Edo States [\[19\]](#). However another study done in a state (Ondo) which also has frequent outbreaks of Lassa fever had poor knowledge of Lassa fever among healthcare workers, these health workers were mainly made up of community health extension workers (CHEW) and community health officers (CHO).

The overall attitude of healthcare workers towards Lassa fever preventive practice in the Federal

Teaching hospital Abakaliki was good. This good level of attitude was not surprising since the majority of the respondent had good knowledge of Lassa fever with regards to transmission and symptoms, this was similar to a comparative cross-sectional study in Lagos state in 2015 comparing knowledge, attitude and practice of healthcare workers working in private and public health facilities within the state on EVD (Ebola virus disease) where the attitude though not as high as recorded in this study as two-thirds of the respondent had a positive attitude however their knowledge levels were higher than that observed in this study [\[20\]](#). This similarity noticed might be a result of the high level of awareness of the diseases among health workers as the EVD study was done post the Ebola outbreak in the country where Lagos state was intimately affected. It is however dissimilar to a descriptive cross-sectional study done at the University of Uyo teaching hospital among doctors and medical students who had a poor attitude despite the high level of knowledge they had about Lassa fever [\[21\]](#). The University of Uyo Teaching hospital does not attend to as many Lassa fever cases as the Federal Teaching Hospital Abakaliki this might give an insight into why there is a dissimilarity in the attitude of healthcare workers despite the good knowledge had by the respondent in both studies [\[5,21\]](#).

Lassa fever prevention control practice of our respondents was found to be poor, this is contradictory since the level of knowledge of Lassa fever and attitude is quite high as demonstrated and factors such as sex, educational status, contact with patients and years of working in FETHA were factors associated with practice. A similar picture was seen in a cross-sectional descriptive study done among healthcare workers consisting of doctors, nurses and laboratory scientists in two teaching hospitals in Southern Nigeria and Northern Nigeria on infection prevention and control it was noticed though knowledge of IPC was high, less than half of the respondent did not show good IPC practice [\[22\]](#). However a study done in some selected LGA in Ondo state among healthcare workers consisting majorly of nurses and community health extension workers working in both public and private primary healthcare facilities showed that both knowledge and practice of Lassa fever prevention were high [\[15\]](#). It was also observed that from this study, poor practice of Lassa fever prevention and control among respondents was significantly lower among

healthcare workers who had 10 years or less working in FETHA compared to those who had more years of experience. This finding is in agreement with the cross-sectional study done among HCWs (doctors, nurses and laboratory scientists) which showed that HCWs with higher years of experience tend to have better infection prevention and control practice compared to those who had low years of practice [22]. The poor preventive practice among healthcare workers indicates a likelihood of easy spread of nosocomial infection within the hospital and the community at large which might have been the reason behind the high number of HCW infections during the 2018 Lassa fever outbreak in Ebonyi State. However, this study was dissimilar to a facility-based cross-sectional study done in Ethiopia where cadre and training were factors associated with safe infection control practice [23].

Conclusion

The knowledge and attitude of healthcare workers towards LF prevention and control were good while the practice was poor. Sex, educational status, patient contact and health workers' years working in the facility were the factors associated with practice among them. The fact that practice was self-reported and not based on direct observations and such could even be worse than what we have seen is a limitation of this study. To enhance LF preventive practices, we recommend that the hospital management ensures adequate provision of protective devices, routine training and supportive supervision of health workers with a special focus on those prone to poor practices.

What is known about this topic

- LF is a zoonotic disease caused by the Lassa virus
- Ebonyi, Edo and Ondo States contribute to 95% of the LF burden in Nigeria
- Prevention of transmission is of great importance in the control of the spread of LF

What this study adds

- The practice of healthcare workers in Alex Ekwueme Federal University Teaching Hospital Abakiliki towards LF prevention and control is poor

- Sex, educational status, patient contact and health workers' years working in the facility were the factors associated with practice among them

Competing interests

The authors declare no competing interests.

Authors' contributions

OI conceptualized, collected the data, conducted the analysis and wrote the draft manuscript, CU conducted data analysis and substantially revised the draft manuscript, IO substantially revised the draft manuscript, SM substantially revised the draft manuscript, AO analysed the data and substantially revised the manuscript, SS substantially revised the manuscript.

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Table 5: Predictors of Lassa fever preventive practices among healthcare workers in Federal Teaching Hospital Abakaliki

Figure 1: Source of Information on Lassa Fever Preventive Practices amongst healthcare workers in Federal Teaching Hospital Abakaliki

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Table 1: Socio-demographic characteristics of healthcare workers at the Federal Teaching Hospital Abakaliki		
Variables	Frequency (n=386)	Percentage (%)
Age (years)		
20-29	32	8.3
30-39	207	53.6
40-49	123	31.9
>50	24	6.2
Mean (\pm SD)	38 (\pm 6.8) years	
Sex		
Male	172	44.6
Female	214	55.4
Marital status		
Married	319	82.6
Single	54	14.0
Others	13	3.4
Religion		
Christianity	383	99.2
Traditional Religion	2	0.5
Atheist	1	0.3
Profession		
Doctor	107	27.7
Nurse	144	37.3
Lab. Scientist	22	5.7
Orderly (Health Assistant)	57	14.8
Mortician	4	1.1
Pharmacist	12	3.1
Physiotherapist	10	2.3
Departments/Units		
Clinic	150	38.7
Pharmacy	13	3.4
Accident & Emergency	54	14.0
Ward	96	24.9
Theatre	42	11.0
Laboratory	24	6.2
Mortuary	7	1.8
Years of practice in the Hospital		
<5	31	8.0
5-9	233	63.5
\geq 10	110	28.5
Trained on Lassa fever IPC		
Yes	282	73.06
No	104	26.94
The duration between the study period and the last training in year(s)		
1	151	53.6
2	74	26.2
\geq 3	57	20.2

Table 2: Knowledge of Lassa fever signs and symptoms among healthcare workers in FETHA

Variable	Frequency (n=386)	Percentage (%)
Awareness of Lassa Fever	386	100
Source of Information		
Colleagues	358	92.6
Media	219	56.7
School	93	24.1
Family/friends	54	13.6
Causative agent of Lassa fever		
Virus	376	97.4
Bacteria	5	1.3
Others (Fungi, Parasites, Rats)	5	1.3
Signs/symptoms		
Fever	374	96.9
Bleeding	368	95.3
Headache	336	87.1
Body weakness	333	86.3
Sore Throat	319	82.6
Vomiting	306	79.3
Malaise	263	68.1
Body pain	240	62.2
Abdominal pain	208	53.9
Dizziness	193	50.0
Nausea	189	48.9
Diarrhoea	182	47.2
Cough	172	44.6
Chest pain	163	42.2

Table 3: Knowledge, attitude and practice of Lassa fever prevention and control among healthcare workers in FETHA (n=386)

Profession	Good Knowledge (%)	Good Attitude (%)	Good Practice (%)
Doctors	96 (89.7)	104 (97.2)	12 (11.2)
Nurses	115 (79.9)	136 (94.4)	44 (30.6)
Lab. Scientist	19 (86.4)	20 (90.1)	2 (9.1)
Orderly(Health Assistants)	48 (84.2)	55 (96.5)	29 (50.9)
Morticians	2 (50.0)	4 (100.0)	2 (50.0)
Pharmacist	10 (83.3)	11 (91.7)	4 (33.3)
Physiotherapist	7 (63.6)	10 (100.0)	5 (50.0)
Potters	24 (80.0)	29 (96.7)	10 (33.3)
Total	316 (81.9)	386 (95.6)	109 (28.2)

Table 4: Predictors of Good knowledge of Lassa fever preventive practices among HCWs in FETHA.

Variable	Good knowledge (%)	Poor knowledge (%)	Adjusted Odds Ratio (95% C.I)	P-value
Lassa Fever IPC Training				
Yes	241 (85.5)	41 (14.5)	1.9 (1.07-3.37)	0.028
No	80 (76.9)	24 (23.1)	1	

Table 5: Predictors of Lassa fever preventive practices among HCW in FETHA				
Variable	Good Practice (%)	Poor Practice (%)	Adjusted Odds Ratio (95% C.I)	P-value
Sex				
Male	27 (15.7)	145 (84.3)	0.4 (0.27-0.72)	0.001
Female	63 (29.4)	151 (70.6)	1	
Educational Status				
Tertiary	65 (19.5)	268 (80.5)	0.4 (0.23-0.83)	0.012
Secondary or less	25 (47.2)	28 (52.8)	1	
Patient Contact				
Yes	49 (18.1)	222 (81.9)	0.4 (0.26-0.68)	<0.001
No	41 (35.7)	74 (64.4)	1	
Years of working in FETHA				
<10	54 (19.6)	222 (80.4)	0.6 (0.34-0.95)	0.031
≥10	36 (32.7)	74 (67.3)	1	

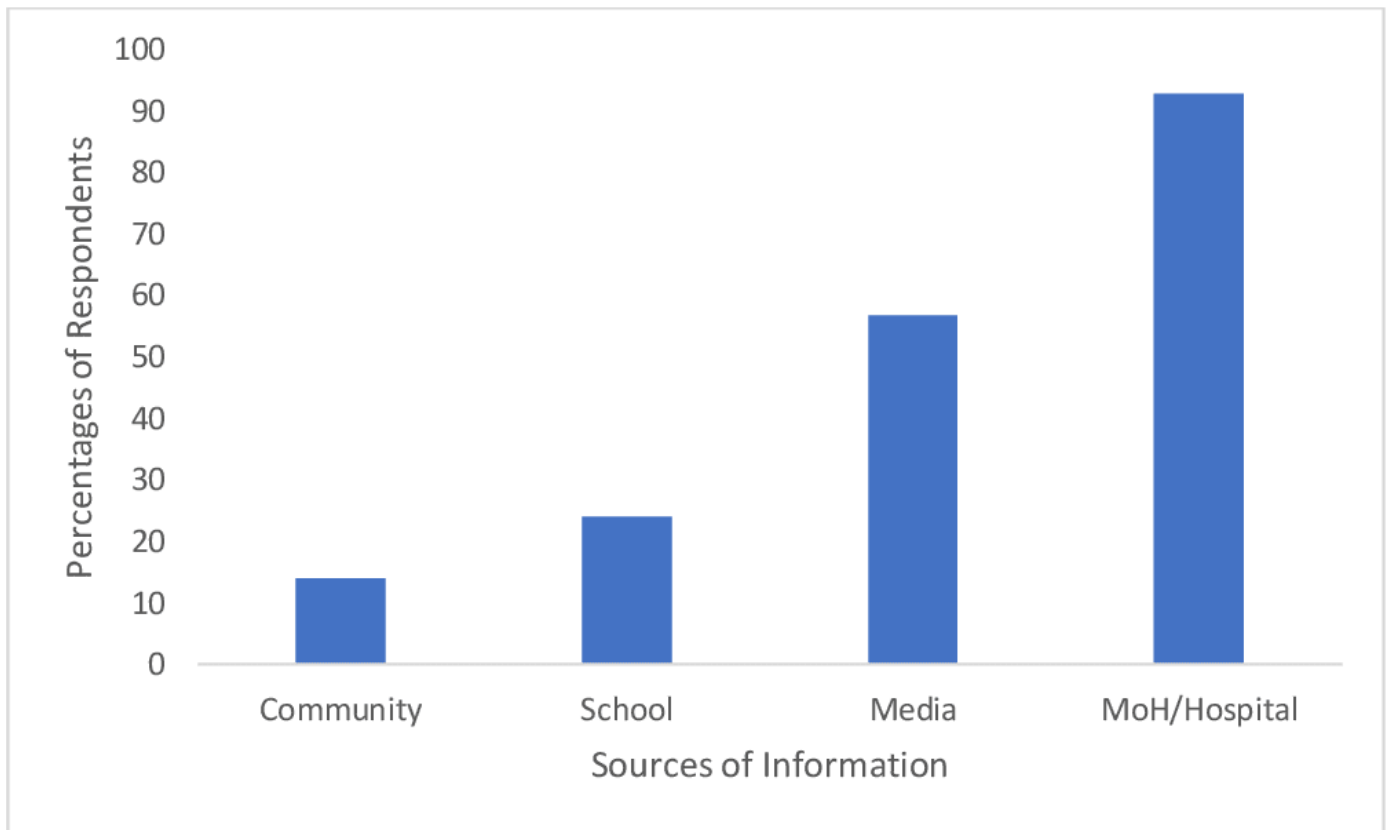


Figure 1: Source of Information on Lassa Fever Preventive Practices amongst healthcare workers in Federal Teaching Hospital Abakaliki