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Knowledge, Attitude and Prevention Practices of Lassa Fever by Staff of University of Benin, Benin City

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Abstract
Endemicity of Lassa fever in Nigeria is a major public health challenge. Epidemiological reports have consistently shown that Lassa fever is a potentially life-threatening and highly infectious disease. This study assessed the knowledge, attitude and measures to prevent Lassa fever, by staff of University of Benin, Benin City, Edo State, Nigeria. The study was a cross-sectional survey of socio-demographics, knowledge, attitude and prevention of Lassa fever by 301 randomly selected consenting staffof the University of Benin, Benin City, using pre-tested structured questionnaires. The SPSS (Statistical Package for Social Sciences version 22) was used for descriptive and inferential analysis using Chi-square test at a significant level of p=0.05. Awareness of Lassa fever and and vector (Mastomys rats) was high (96.3% and 62.5% of respondents know that the Mastomys rat was the reservoir of Lassa fever virus; 54.5% and 67.1%, knew that Lassa fever was transmitted by contact with blood/secretions and urine/feces of infected rats; only 9.3% knew that Lassa fever could be transmitted through sexual intercourse. Respondents' knowledge of predisposing factors to Lassa fever infection included: traditional practicessuch as the handling of infected corpses (80.7%), poor compliance to standard precautions (46.2%), direct contact with infected person (49.2%) or eating of rodent (81.1%).Respondents (75.4%) perceived Lassa fever as a very serious disease.Attitude of respondents was significantly associated with risk awareness (p<0.004) and perception (p<0.007) respectively, rather than with knowledge (p<0.525). Preventive practices was significantly associated with older staff (p<0.02) and risk awareness (p<0.007). Awareness and risk perception of Lassa fever were very high, but specific knowledge of mode of transmission, and behaviors that increase risk of exposure to Lassa fever, were low.

Key words: Lassa fever, Preventive, Knowledge, Attitude, *Mastomys natalensis*, Risk

Introduction
Lassa fever (LF), a public health challenge in endemic areas of West Africa, is an acute and sometimes fatal viral haemorrhagic disease which occurs along the Lassa belt between Nigeria to the east and Sierra Leone, Guinea and Liberia to the west. LF is caused by Lassa virus (LASV), a bi-segmented single stranded RNA virus of the family *Arenavividae*; and the disease accounts for some 300,000-500,000 cases and 5000 deaths annually. LF was first identified in Nigeria in 1969, when two Nurses died of a seemingly mysterious disease in Lassa village, Borno State, Nigeria [1, 2, 3]. In endemic countries, studies have shown that the seroprevalence of Lassa fever virus (LASV) in human populations range from 8-22% in Sierra Leone, 4-55% in Guinea and 7-22% in Nigeria[4].

Until recently, *Mastomys natalensis*, an ubiquitous and peri-domestic rodent, was regarded exclusively as the reservoir of LASV. *M. natalensis*, is known to exhibit asymptomatic infection but excrete the virus in copious amount in the urine, feces, saliva and blood faeces[5,6]. Putatively, the primary mode of transmission of LASV to man is through contact with infected rodent excretions and secretions such as blood, saliva, feces or urine in human food; or during hunting and processing of rats for consumption [7,8].Secondary person-to-person transmission can occur through exposure to infected persons' blood or bodily secretion of infected cases (dead or alive) [9]. The role of other *Mastomys* species (*M. erythroleucus* and *M. hildbrandtii*) and other non-*Mastomys* rats as potential reservoirs of LASV in the transmission and maintenance of LF infection have long been suspected [10,11,12,13]. Current studies have identified LASV in *Hylomys cuspamfi* in Nigeria and *M. erythroleucus* in Nigeria and Guinea [14].

Symptoms of LF in man are similar to that of Ebola, Lujo and Crimean-Congo Haemorrhagic Fever but are rarely associated with bleeding from orifice. Case definition of suspected Lassa fever consists of known exposure to a person who has had LF, fever >38^{o}C for less than three weeks with absenceof signs of local inflammation, and anytwo major signs (Bleeding, swollen neck or face, conjunctival or sub conjunctival haemorrhage, spontaneous abortion, pectechial or haemorrhagic rash, new onset tinnitus or altered hearing,

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persistent hypotension) or one major and two minor signs (headache, sore throat, vomiting, diffuse abdominal pain/tenderness, chest/retrostenal pain, cough, diarrhea, generalized myalgia or arthralgia or profuse weakness) [15]. Swollen face and neck are classic signs of Lassa fever but only occur in about 10% of cases. Currently, Ribavirin® is the only effective drug of choice for LF treatment-though the use of ethnomedicinal remedies in treatment of people and animals infected with viral infections have been documented [16,17,18,19].

Over the years, several outbreaks with LF confirmed cases and mortality has been reported in Nigeria [20,21]. Edo State is known as a LF epicenter in Nigeria, with several reported outbreaks including the recent 2015/2016 epidemic [22]. Some studies which investigated the knowledge, attitude and practices of LF have been conducted in Nigeria. [7,8,23,24,25]. These ranged from assessment of knowledge of LF amongst health workers (physicians and nurses) in rural communities in South-south zone of Nigeria including Edo State [7,8,23] to LF awareness amongst rural community dwellers in southwest [25] and central Nigeria [26]. Studies on knowledge, attitude and practice (KAP) on LF in Edo State have mainly focused on health care providers of the state. Although Bamigboye [24], Ighedosa [8] and co-workers investigated rat infestation in halls of residence in the Obafemi Awololo University and KAP by students of the University of Benin, there is paucity of information on the KAP on Lassa fever amongst staff of Federal institutions in Nigeria. This study assesses the knowledge of Lassa fever transmission, predisposing factors, attitude and prevention of Lassa fever, by staff, in the two campuses of the University of Benin, Edo State, Nigeria.

Material and Methods

Study area

The study area was the two campuses (Ugbowo and Ekewan) of the University of Benin, Benin City, Edo State, which is located in Nigeria's South-South geopolitical zone. The University of Benin was established in 1970 and currently has about 18 faculties and schools, which offer courses at postgraduate, undergraduate, diploma and certificate levels. A total of over 80,000 students are currently enrolled in various full-time or part-time programmes, with about 8000 academic and non-academic staff.

Study design

This study was a descriptive, quantitative, cross-sectional epidemiological survey of staff in both campuses of the University of Benin, Benin City.

Study Population

The study population was 8,000 comprising of both academic and non-academic staff.

Sample Size Determination

The sample size was calculated using the Cochran's formula [27]. Using a LF prevalence of 21% and an attrition rate of 10%, a final minimum sample size of 284 was obtained. However, a total of 301 respondents were finally sampled to make room for non-response.

Sampling Technique

Sampling frame for staff was the total staff population in all faculties and schools of the University in both campuses. A sampling fraction was determined by dividing the calculated sample size by the sampling frame. The sampling fraction was applied to populations of staff in each faculty, to determine the effective sample size for the stratum. The selection of sampling unit (respondents) was done by balloting.

Study instrument

The study instrument was a pre-tested structured questionnaire divided into sections to obtain socio-demographic profile (sex, age, marital status, religion, occupation, staff category, highest level of education, and residence), knowledge of LF transmission, prevalence and predisposing factors. The questionnaire was self-administered by consenting respondents. Ethical approval was obtained from the ethics committee of the University of Benin Teaching Hospital and all information was kept confidential. The study employed quantitative technique in data collection.

Data analysis

Data were collated, collated and screened for accuracy on Microsoft Excel (Microsoft Corporation, Redmond Washington). This was later exported to SPSS (Statistical Package for Social Sciences version 22) and analyzed. Results of descriptive and inferential analysis using Chi-square test at a significant level of $p=0.05$ were presented in tables. Chi square was used to test association between the socio-demographics, knowledge, attitude and preventive practices.

Results

A total of 301 completed questionnaires were analyzed. Males accounted for 43.2% of sampled staff while 50.8% were females; 92% the respondents were aged between 15 and 54 years (Table 1). Being an academic environment, 90.6% of staff members were found to have either a diploma, Bachelor of Science (BSc.) or postgraduate degrees; and 60.8% of the staff lived off-campus.

Table 1: Socio-demography of sampled staff of the University of Benin (N=301)*

Respondents	**No (%)**
Sex	
No response	18 (6.0)
Male	130 (43.2)
female	153 (50.8)
Age Group	
No response	8 (2.7)
Young adults (15-24 years)	118 (39.2)
Middle-aged adults (35-54 years)	159 (52.8)
Old adults (>55 years)	16 (5.3)
Marital Status	
No response	7 (2.3)
Single	81 (26.9)
Married	204 (67.8)
Divorced	4 (1.3)
Widowed	5 (1.7)
Religion	
No response	15 (4.9)
Christian	267 (88.7)
Muslim	14 (4.7)
Traditional	5 (1.7)
Occupation	
No response	21 (7.0)
Academic staff	76 (25.2)
Non academic	204 (67.8)
Category of Staff	
No response	19 (6.3)
Senior	218 (72.4)
Junior	64 (21.3)
Highest Level of Education	
No response	28 (9.3)
Basic level (WASSCE/GCE/NECO)	35 (11.6)
Higher level (Diploma, B.Sc.)	116 (38.5)
Postgraduate (M.Sc., PhD)	122 (40.5)
Residence	
No response	99 (32.9)
On-campus	19 (6.3)
Off-campus	183 (60.8)

Lassa fever was not new to 290 (96.3%) of the staff sampled for this study as 212(70.4%) have either first heard of the disease in 2014 or prior to that time period. Though the first source of knowledge of Lassa fever to the respondents varied from the media (n=181, 60.1%), internet (n=19, 6.3%), campus campaigns (n=24, 8.0%) and friends (n=66, 21.9%) respectively, 240(79.7%) demonstrated good knowledge of the disease. This was assessed based on responses to indicator questions shown in Table 2 (a, b, c). However, about half of the respondents (137, 45.5%) were unaware that exposure to body secretions from infected rats could predispose an individual to infection with Lassa fever virus. More so that 91(30.2%) could neither identify nor were sure of the specific reservoir of Lassa fever virus. 58(19.3%) of respondents still engaged in hunting for or eating rats. A number of the respondents were unaware that traditional practices such as the handling of infected corpses (n=243, 80.7%), poor compliance to standard precautions (n=139, 46.2%), direct contact with infected person (n=148, 49.2%) or eating of rodent (n=244, 81.1%) could predispose humans to infection of Lassa fever virus.

Table 2a: Knowledge of respondents on Lassa fever prevalence

(N=301)*

Indicator	Response No(%)
Have you heard of Lassa fever?	
No	5 (1.7)
Yes	290 (96.3)
Not sure	1 (0.3)
What is the cause of Lassa fever?	
virus	264 (87.7)
bacterium	13 (4.3)
animal	2 (0.7)
witches/wizard	1(0.3)
not sure	14 (4.7)
What is the reservoir of Lassa fever virus?	
All rats	26 (8.6)
Long nose rat	59 (19.6)
House rat	5 (1.7)
Mastomys rat	188 (62.5)
Not sure	1 (0.3)
Can rat transmit Lassa fever to man?	
No	29 (9.6)
yes	233 (77.4)
not sure	19 (6.3)

Table 2b: Knowledge of respondents on transmission of Lassa fever

Indicator	Response No (%)
Contact with blood/secretions of infected rat	
No	137 (45.5)
Yes	164 (54.5)
Contact with urine/feces of infected rats	
No	99 (32.9)
Yes	202 (67.1)
Eating bush meat	
No	250 (83.1)
Yes	51 (16.9)
Eating rat	
No	243 (80.7)
Yes	58 (19.3)
Exposure to infectious body fluid and secretion	
No	168 (55.8)
Yes	133 (44.2)
Curses and spells	
No	282 (93.7)
Yes	19 (6.3)
Sexual intercourse	
No	273 (90.7)
Yes	28 (9.3)
Caring for Lassa fever patient	
No	201 (66.8)
Yes	100 (33.2)
Inhalation of viral particles	
No	242 (80.4)
Yes	59 (19.6)

Table 2c: Knowledge of respondents on the predisposing factors to lassa fever

Indicator	**Response No (%)**
Residence or visit to rural areas	
No	255 (84.7)
Yes	46 (15.3)
Poor compliance to standard precautions	
No	139 (46.2)
Yes	162 (53.8)
*Traditional handling of corpse*s	
No	243 (80.7)
Yes	58 (19.3)
Direct contact with persons infected with the disease	
No	148 (49.2)
Yes	153 (50.8)
Eating of rodent	
No	244 (81.1)
Yes	57 (18.9)
Insanitary disposal of waste	
No	199 (66.1)
Yes	102 (33.9)
Which age group is at risk?	
Children	5 (1.7)
Adult	6 (2.0)
Elderly	1 (0.3)
All age group	279 (92.7)

practices against Lassa fever disease was also found to be significantly associated with age different age category ($p<0.02$) and risk awareness ($p<0.007$) of respondents respectively.

The evaluation of the risk awareness and perception (Table 3) shows that respondents were aware (n=198, 65.8%) of and perceived Lassa fever as a high risk disease (n=276, 91.7%). This was in contrast to 11(3.7%) and 101(33.6) who demonstrated low perception and low risk awareness respectively. Preventive and hand washing practices were found to be good in 144 (47.8%) and 176(58.5%) with the general attitude of respondents (n=276, 91.7%) ranked as either excellent or good.

In Table 4, attitude of respondents was found to be significantly associated with risk awareness ($p<0.004$) and perception ($p<0.007$) respectively, rather than with knowledge ($p<0.525$, not shown in the table). However, knowledge demonstrated about the disease was significantly different across gender ($p<0.031$). Preventive

Table 3: Risk awareness and perception to Lassa fever amongst staff of the University (N=301)*

Indicator	N (%)
Risk awareness	
Which age group is at risk?	
No response	10 (3.3)
Children	5 (1.7)
Adult	6 (2.0)
Elderly	1 (0.3)
All age group	279 (92.7)
Is there currently an outbreak of Lassa fever in Edo State?	
No response	14 (4.7)
No	37 (12.3)
Yes	204 (67.8)
Not sure	46 (15.3)
Have you heard, seen or know anyone who suffered from Lassa fever?	
No response	6 (2.0)
No	225 (74.8)
Yes	70 (23.3)
Are vaccines available for treatment?	
No response	7 (2.3)
No	86 (28.6)
Yes	108 (35.9)
Not sure	100 (33.2)
Can Lassa fever be cured?	
No response	9 (3.0)
No	204 (67.8)
yes	28 (9.3)
not sure	60 (19.9)
Risk perception	
How do you feel about possibility of Lassa fever infection?	
No response	13 (4.3)
Very seriously	227 (75.4)
Slightly serious	36 (12.0)
Not very serious	25 (8.3)
How serious is Lassa fever?	
No response	9 (3.0)
Very serious	249 (82.7)
Slightly serious	27 (9.0)
Not very serious	11 (3.7)
Not sure	5 (1.7)

Discussion

Lassa fever disease has persisted in the Lassa belt of West Africa for the past 48 with the first reported case in the then North-Eastern part of Nigeria (now known as Borno State). Since its identification, periodic outbreaks has occurred in many states of Nigeria with Edo State regarded as the epicentre of the disease in the country. Information of the disease has been disseminated through various methods such as jingles, dramas, campaigns, public lectures and talk shows. Hence, there is a high level of awareness of the disease amongst the public which is reflected in the knowledge of the respondents sampled about the disease. The media (radio, television, newspaper and internet) was the most frequently mentioned initial source of information about LF amongst the staff of the university.

The study shows that knowledge of LF transmission, prevalence and predisposing factors was good amongst staff of the University community. The finding was different from the result obtained in s similar study which found the general knowledge of student of the same University to be poor [8]. A high level of awareness with radio and television as the main source of information on Lassa fever was similarly reported in a study conducted on the knowledge attitude and pratices amongst health workers in Edo State [23,28] and students of the University of Benin [8].

Specific knowledge gap remains on some aspect of the transmission of Lassa fever virus. Some respondents were unaware that exposure to secretions of infected rats (45.5%), traditional practice of handling infected corpses (80.7%), direct contact with infected person or eating of rats (81.1%) could predispose humans to

Table 4: Association between preventive Knowledge, attitude and practices with socio-demographics amongst staff of the University (N=301)*

Variable	category	Age			Gender		Risk perception		Risk awareness	
		young adult	middle-aged	old	male	female	High	Low	High	low
Knowledge	good	99	128	13	125	115	218	10	152	86
	poor	27	31	3	23	38	58	1	46	15
			P=0.911			*P=0.031*	*P=0.301*		*P=0.059*	
Attitude	excellent	78	105	8	97	94	182	3	137	53
	good	36	43	6	37	48	76	5	51	34
	poor	12	11	2	14	11	18	3	10	14
			P=0.704			*P= 0.417*	*P=0.007*		*P=0.004*	
Practice	excellent	33	71	6	49	61	103	3	85	25
	Good	71	67	6	70	74	133	6	88	56
	poor	22	21	4	29	18	40	2	25	20
			P=0.02			*P=0.141*	*P=0.788*		*P=0.007*	
Hand washing	Excellent	4 3	42	3	30	58	81	5	57	31
	Good	68	100	8	95	81	166	3	122	53
	poor	15	17	5	23	14	29	3	19	17
			P=0.083			*P=0.002*	*P=0.063*		*P=0.139*	

*total number of responses for each variable varied somewhat from total number of respondents due to non-response

infection with the Lassa fever virus. This is further complicated by the fact that 30.2% could either not correctly identify the specific reservoir of the Lassa fever virus or were unsure. This may explain why 81.1% of the respondents still consume rats. This value is much lower than what was obtained for students (10.5%) of the University in a similar study [25]. The virus is known to be stable as aerosol at a low humidity of 30% with a biological half-live of 10.1 to 54.6 minutes at 24^0C and 32^0C respectively; while heating of food for at least 56^0C for 30 minutes [7, 26]. The public health implications is that improper handling of infected rat during preparation prior to consumption could expose an individual to infection by Lassa fever virus with potential spiralling risk of infection to family members and acquittances. The risk of exposure to such improper handling of rats either prior to disposal or consumption may have been associated with the increased outbreaks following activities such as rat decimation campaigns [4]. Moreover, predisposing risk factors persist in many affected communities such as traditional burial practices which may contributes to the persistent outbreaks and maintenance of the Lassa fever virus in Lassa fever epicenters such as Edo State. This will also be further complicated when knowledge on the transmissbility of Lassa fever virus through direct contact with body secretions of infected persons is absent.

In this study, knowledge was not significantly associated with risk awareness or perception ($p>0.05$). The risk awareness and risk perception of the LF disease was found to be high in 65.8% and 91.7% of University staff respectively. Risk awareness and risk perception can promote, personal hygiene, high index of suspicion, Lassa fever disease surveillance, and preventive practices including environmental sanitation, housing conditions in residential quarters, monitoring of restaurants with modification of food consumption habits.

Conclusion

Awareness and risk perception of Lassa fever were very high, but specific knowledge of mode of transmission, and behaviour that increase risk of exposure to Lassa fever were low. There is need for community empowerment on knowledge of socio-cultural risky behaviours that promote exposure to Lassa fever infection, with training on specific preventive practices at individual (hand washing) and institutional levels, especially strict compliance with standard precautions while nursing or treating clients with signs and symptoms suggestive of Lassa fever disease.

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Competing interest

The author's declare no competing interests.

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