Journal of Epidemiology and Global Health
Vol. **9**(**2**); June (2019), *pp.* 107–115
DOI: https://doi.org/10.2991/jegh.k.190514.001; ISSN 2210-6006; eISSN 2210-6014
https://www.atlantis-press.com/journals/jegh

Research Article

Lassa Fever-associated Stigmatization among Staff and Students of the University of Benin, Nigeria

Stella Folajole Usifoh[1], Amienwanlen Eugene Odigie[2,*], Stephena Udinmande Ighedosa[3], Edwin Aihanuwa Uwagie-Ero[4], Isoken Tito Aighewi[5]

[1]*Department of Clinical Pharmacy and Pharmacy Practice, Faculty of Pharmacy, University of Benin, Benin City, Nigeria*
[2]*Department of Public Health and Preventive Medicine, Faculty of Veterinary Medicine, University of Benin, Benin City, Nigeria*
[3]*Department of Community Health, University of Benin Teaching Hospital, Benin City, Nigeria*
[4]*Department of Surgery, Faculty of Veterinary Medicine, University of Benin, Benin City, Nigeria*
[5]*Department of Environmental Management and Toxicology, Faculty of Life Sciences, University of Benin, Benin City, Nigeria*

ARTICLE INFO

Article History
Received 26 February 2019
Accepted 21 April 2019

Keywords
Associated stigmatization
Lassa fever
psychosocial
staff
students
University of Benin

ABSTRACT

Lassa Fever (LF) remains a health burden in several endemic areas of Nigeria, and its toll remains unabated over several decades. Although most studies have focused on virological and clinical considerations, few studies have attempted to address the perceived psychosocial component of LF disease in Nigeria. Evaluation of stigmatization and discrimination faced by LF survivors is an important step in improving individual health and protecting public health. This study aimed to assess LF-associated stigmatization associated among staff and students of the University of Benin. Descriptive analyses of 600 consenting respondents (300 staff and 300 students) sampled using pretested questionnaires was conducted, and the Chi-square test was used to test for significant association between perceived LF stigmatization and predefined variables. LF was a potential cause of stigmatization in a higher proportion of student (n = 162, 57.9%) than staff (n = 112, 39.9%). LF-associated stigmatization among students was significantly associated with sex (p = 0.012) and poor knowledge (p = 0.013) of LF transmission and prevention. A greater tendency for stigmatization was observed among females than males. A comprehensive emergency response plan incorporating accurate knowledge dissemination about the disease may be a first step toward tackling perceived LF stigmatization.

1. INTRODUCTION

Lassa Fever (LF) remains a health burden in several endemic areas of West Africa including Nigeria, and the toll in case fatality remains unabated over several decades. The disease results in 500,000 cases annually and approximately 5000 deaths in endemic West Africa. Although the overall case fatality rate is 1% [1], mortality can be as high as 15–20% in hospitalized LF patients and up to 50% during outbreaks [2–5]. LF was first described in 1969 in the town of Lassa, in present-day Borno State, Nigeria, and recurrent seasonal outbreaks occur in the Lassa belt of West Africa comprising Nigeria, Liberia, Sierra Leone, and Guinea. LF is also known to be endemic in Benin, Ghana, and Mali [1]. LF disease is an acute viral hemorrhagic disease caused by Lassa Virus (LASV), a bisegmented single-stranded RNA virus, which belongs to the family Arenaviridae [1,6]. The putative reservoir of LASV is the *Mastomys natalensis*, which is known to exhibit asymptomatic infection but results in copious shedding of the virus in the urine, feces, saliva, and blood of infected rats [1,7]. The presence of *M. natalensis*, a rodent indigenous to most of sub-Saharan Africa, within households is closely associated with LF outbreaks in rural settings and precipitated by accessibility to grains and sociocultural practices such as bush burning [8].

In 80% of human cases, the disease is asymptomatic, but in the remaining 20% a complicated course leading to death may result in nonspecific symptoms indistinguishable from other Viral Hemorrhagic Fevers (VHFs) such as Ebola and Marburg. Typically, human infection results from contact with secretions and excretions of infected rats and other infected persons through respiratory or gastrointestinal tracts. Inhalation of aerosolized infective viral LASV particles is the most significant means of exposure, although infection through mucous membranes and abraded skin has been reported [9,10]. The severity of LF correlates with the titers of LASV in blood and bodily secretions [11]. There is no evidence of LASV transmission during the incubation period or after recovery, apart from sexual transmission because of delayed clearance from the gonads of <3 months after acute infection. However, the frequency of transmission through sexual contact has not been established [12].

Currently, Ribavirin is the only effective drug of choice for LF treatment. Ribavirin (1-β-D-ribofuranosy-L-1,2,4-triazole-3-carboxamide), a guanosine analog, when administered intravenously within the first 6 days of illness reduces mortality from

*Corresponding author. Email: eugene.odigie@uniben.edu

55% to 5% [13,14]. Although the precise mechanism of action is in dispute, Ribavirin appears to interfere with viral replication in inhibiting RNA-dependent nucleic acid synthesis. The drug has been used in varying degrees in the treatment of other arenavirus infection (Junin and Machupo viruses), hemorrhagic fever with renal syndrome, Crimean–Congo hemorrhagic fever, hepatitis C, respiratory syncytial virus pneumonia, La Crosse encephalitis, influenza, and other adenovirus infections [14]. Research in recent years has focused on finding alternative therapeutics, and results in experimental animals using ST-193 developed by SIGA Technologies Inc., Corvallis, Oregon, 97333, United States, are promising [15].

Psychosocial manifestations of stigmatization and discrimination (perceived or real) in disease outbreaks have been described as a global phenomenon that is as old as the disease itself—a term that essentially induces a sense of stigma [16–18]. Stigma has been defined as a mark of shame or an attribute that is deeply discrediting within a particular social interaction. Stigma and discrimination against infected individuals pose significant barriers, negatively affecting access to care and treatment [15,19–21]. These can substantially increase the suffering of infected individuals and can be strong disincentives for individuals in seeking prompt medical care. Consequent to such delays in treatment is the propensity for affected individuals to remain undetected in the community. In addition, stigmatization against professionals and volunteers working in the field has been implicated as a leading cause of high rates of stress and burnout. As noted by Person et al. [22], this attitude toward infected persons stems from the evolving nature and inherent scientific uncertainties associated with infectious diseases.

Some studies have focused on stigmatization associated with such infectious diseases as Severe Acute Respiratory Syndrome (SARS), AIDS, tuberculosis, avian influenza, Ebola, and neglected tropical diseases [16,21,23–25]. For example, Bennis et al. [26] observed that neglected tropical disease such as cutaneous leishmaniasis had a psychosocial impact in high school students in a province in Morocco, leading to self- and social-stigma even though the disease is not life-threatening [9]. Although most studies have focused on virological and clinical considerations, few studies have attempted to address the psychosocial component of LF disease in Nigeria. The focus has been more on the impact the disease on the mental health status of health professionals than the potential level of stigmatization experienced from the social cycle—institutional, community, state, regional, and national. In the study by Ji et al. [23], both healthcare workers who treated patients with hemorrhagic fever and their survivors were found to be prone and demonstrated psychological symptoms following outbreaks. Among healthcare workers, psychological effects included coping with the deaths of colleagues, anxiety, fear of contamination, threats to their lives, and working excessive number of hours—which reduce work efficiency and increase occupational risks. Sources of mental stress for Ebola viral disease survivors included sufferings and deaths of family members and friends; the collapse of national, social, and economic security; high mortality rate; and strict biosecurity restrictions [23].

Evaluation of perceived LF-associated stigmatization toward LF patients and survivors are an important first step in early disease reporting and protection of public health. This study aimed to assess the perceived stigmatization associated with LF outbreaks among staff and students of the University of Benin (UNIBEN), Benin City, Nigeria.

2. METHODS

2.1. Study Design

This work was designed as a cross-sectional study using a stratified random sampling of staff of the UNIBEN on both campuses.

2.2. Study Area

The study was conducted at the two campuses (Ugbowo and Ekenhuan) of the UNIBEN, which is in Nigeria's South–South geopolitical zone, Benin City, Edo state, Nigeria. The university, which was established in 1975, is one of Nigeria's first-generation federal universities with two campuses, located at Ugbowo and Ekenhuan Road in Benin City. At present, the university has about 18 faculties and schools that offer courses at postgraduate, undergraduate, diploma, and certificate levels.

Investigations in the 1970s and 1980s pointed to the existence of three disease-endemic zones within Nigeria, which includes the northeastern, central, and southern regions [27]. Since 2003–2004, when a hospital-based survey was first conducted in Irrua, Edo State, increases in LF cases have consistently been demonstrated over the years in the state.

2.3. Study Population

The total student enrolment currently stands at more than 80,000, made up of both full- and part-time students shared among the various faculties, with staff strength of about 8000 academic and nonacademic staff. The university has eight hostels in Ugbowo and two hostels in Ekenhuan campus with a total population of about 15,000 resident students, whereas other students live off-campus.

2.4. Ethical Consideration

Ethical approval for the study was obtained from the Ethics Committee of the University of Benin Teaching Hospital. All information obtained was kept confidential.

2.5. Sample Size Determination

The Cochran formula [23,28] for sample size determination with an LF prevalence of 21%, which has been described in previous studies reported by the authors [5,29–31], was applied that gave a sample size of 255. Using a 10% attrition rate, we had 285 respondents each for staff and students. However, a total of 600 respondents (300 staff and 300 students) were sampled to make room for nonresponses (Ugbowo and Ekenhuan). The inclusion criteria called for UNIBEN students who were official residents in the hostels, as well as academic and nonacademic staff of UNIBEN, whereas those excluded were UNIBEN students who were squatters in the halls of residence, those in staff residence, as well as contractual staff of the University.

2.6. Sampling Technique

A stratified random sampling technique was used. The sampling frame for students was the total student population resident in all hostels (n = 10) on both campuses. A sampling fraction was determined by dividing the calculated sample size by the sampling frame. The sampling fraction was applied to the population of students' resident in each hostel of residence to determine the effective sample size for the stratum. The number of rooms to be sampled was determined by dividing the number of rooms per hostel by the effective sample size. The selection of the sampling unit (respondents) was done by balloting.

The sampling frame for staff was the total population of academics and nonacademics in all Faculties/Colleges, Schools, Registry, Vice Chancellor's Office (VCO), Bursary, and Library. The effective sample size was determined by application of the sampling fraction on the population. The proportion of the effective sample allocated to the departments was determined by the staff population within that department. The sampling units were selected by balloting within the departments.

2.7. Data Collection

A self-administered pretested questionnaire that was presented in different sections was given to consenting respondents. Data on respondents' sociodemographic details, LF-associated stigmatization, and knowledge, attitude, and practices on LF transmission, prevalence, and predisposing factors were obtained. A probability random sampling by balloting was used, and questionnaires administered to selected respondents. A total of 600 (300 for students and 300 for staff) questionnaires were randomly distributed and retrieved among consenting students and staff in their rooms and offices.

2.8. Statistical Analysis

Data were collected and inputted into Microsoft Excel (Microsoft Corporation, Redmond, WA, USA), sorted, checked for accuracy, and thereafter exported into SPSS (version 22; IBM Corp., Armonk, NY, USA) and analyzed. Perception of LF-associated stigmatization was assessed on the basis of the respondents' disposition toward willingness to relate or patronize LF survivors, promptly report cases of LF in family members, and acceptance of approved vaccines, when available. Specific questions to assess knowledge of respondents were also obtained and a score was assigned to each correct response. Based on the total score, a scale of respondents' perceived stigmatization and knowledge was categorized as high or low and good or poor, respectively.

Similarly, the level of education was ranked based on the highest certificate acquired by respondents. Basic education described respondents who have obtained West African Senior School Certificate Examinations/General Certificate in Examinations/National Examinations Council (WASSCE/GCE/NECO), whereas higher education describes respondents who have diploma, Bachelor of Science (BS), Master of Science (MS), or Doctor of Philosophy (PhD) degrees. A scale was developed for both perceived risk awareness and risk perception and ranked as either high or low, respectively.

Inferential analysis between the various categorical variables was conducted using the Chi-square test.

3. RESULTS

A total of 600 consenting respondents (300 staff and 300 students) participated in the study Table 1. The mean ages of staff and students of the University were 38.09 ± 9.41 years and 20.84 ± 4.61 years, respectively. The duration of employment for staff displayed a median of 4 years (interquartile range = 2–7) with a higher proportion of nonacademics (n = 274, 72.9%).

In the event of LF disease, 13.78% of staff (n = 39) and 21.6% of students (n = 62) were either unsure or unwilling to accept an approved LF vaccine for themselves even when this becomes available Table 2. Neither will 12.7% (n = 36) staff nor 18.1% (n = 48) students willingly approve vaccination of their children against LF when available. Meanwhile, 14.2% (n = 41) staff and 22.9% (n = 65) students (n = 65, 22.9%) indicated that they would refrain from reporting the LF when it occurs in a family member.

Lassa fever-associated stigmatization was high among students (n = 162, 57.9%) than among staff members (n = 112, 39.9%). By contrast, more staff (n = 169, 58.9%) showed a low LF-associated stigmatization in comparison with students (n = 118, 41.1%) with a significant association of $p < 0.0001$ (not shown in Table 1). The perceived stigmatization among staff was not significantly associated with age, sex, level of education, knowledge, risk awareness, and risk perception Table 3. In contrast, LF-associated stigmatization among students was significantly associated with sex (p = 0.012) and knowledge (p = 0.013) of LF transmission and prevention Table 4. The result of knowledge of LF prevalence, transmission and predisposing factors as well as risk awareness and perception are presented in Table 5 and 6 respectively. In the study population, perceived LF-associated stigmatization was higher among female respondents than their male counterparts.

4. DISCUSSION

The study reveals that there remains a potential for stigmatization against individuals with LF in Nigeria even as the current (2018) outbreak portends more challenges in the following years. The Nigeria Centre for Disease Control (NCDC) reported that the total number of confirmed and suspected cases was 175 from 19 states as of February 7, 2016 [32]. In comparison, 731 suspected and 275 confirmed cases have been reported from January 2018 to February 2019 [33]. Prompt health-seeking "behaviors" for the LF containment is influenced by psychosocial factors such as fear of self- or social-stigma. In consequence, fear of stigma or outright stigmatization will influence health-seeking behaviors and promote engagement in self-medication or other unorthodox therapeutic alternatives—thus hampering efforts at effective LF surveillance system. The public health implication is that the chain of LF infection is likely to be sustained because of ignorance of risk factors, which in turn leads to risky behaviors. Improved preventive practices and reduced social stigmatization to LF hinge on continued dissemination of accurate information on LF disease.

Table 1 | Sociodemographic data of staff and students of the University of Benin

Variable	Respondents	Category	Frequency (n = 300)[a]	
			Staff, n (%)	Students, n (%)
Age (years)		15–24	6 (2.0)	268 (89.9)
		25–34	112 (38.2)	23 (7.7)
		35–44	109 (37.2)	5 (1.7)
		45–54	50 (17.1)	1 (0.3)
		>55	16 (5.5)	1 (0.3)
Sex		Male	130 (45.9)	139 (46.5)
		Female	153 (54.1)	160 (53.5)
Marital status		Single	81 (27.6)	291 (98.0)
		Married	204 (69.4)	6 (2.0)
		Divorced	4 (1.4)	
		Widowed	5 (1.7)	
Level of education		Secondary	18 (6.6)	230 (84.6)
		Graduate	133 (48.7)	36 (13.2)
		Postgraduate	122 (44.7)	6 (2.2)
Rank	Staff	Academic staff	76 (27.1)	
		Nonacademic	204 (72.9)	
Staff category		Senior	218 (77.3)	
		Junior	64 (22.7)	
Years of employment		1–10	150 (80.2)	
		11–20	21 (11.2)	
		21–30	9 (4.8)	
		31–40	7 (3.7)	
Level of study	Student	1st year	162 (60.2)	
		2nd year	38 (14.1)	
		3rd year	25 (9.3)	
		Final year	36 (13.4)	
		Postgraduate	8 (3.0)	

[a]Total number of responses for each variable varied from the total number of respondents because of nonresponse.

Table 2 | Assessment of perceived level of stigmatization among staff and students of the University of Benin[a]

Assessment of perception	Responses	Staff, n (%)	Student, n (%)
Would you accept to take an approved vaccine?	No	19 (6.7)	33 (11.5)
	Yes	244 (86.2)	225 (78.4)
	Not sure	20 (7.1)	29 (10.1)
Would accept a vaccine for your children?	No	16 (5.6)	24 (9.1)
	Yes	248 (87.3)	217 (81.9)
	Not sure	20 (7.0)	24 (9.1)
Would you keep it secret if a family member contracted LF?	No	248 (85.8)	219 (77.1)
	Yes	19 (6.6)	26 (9.2)
	Not sure	22 (7.6)	39 (13.7)
Would you buy from the shop of a recovered patient of LF?	No	109 (38.2)	156 (55.7)
	Yes	121 (42.5)	76 (27.1)
	Not sure	55 (19.3)	48 (17.1)
Would you relate freely with a colleague who recovered from LF?	No	33 (11.7)	66 (23.5)
	Yes	206 (73.0)	149 (53.0)
	Not sure	43 (15.2)	66 (23.5)

[a]Total number of responses for each variable varied from the total number of respondents due to nonresponse. LF, Lassa fever.

However, as postulated by Person et al. [22], a behavioral strategy that addresses the needs of a segment of the population at risk of becoming stigmatized and discriminated against is the best way of containing fear. However, this should be complemented by specific campaigns targeted at the other factions of the population with a high tendency to stigmatize. We also propose that education and communication campaigns be tailored to fill specific knowledge gaps on available therapeutics and strategy for support and reintegration of survivors into the social cycle.

Ribavirin has remained the drug of choice for decades, although uniform guidelines for use, dose, or duration of therapy remain a challenge [7,14,18,24]. This study shows LF-associated perception to acceptance of vaccination in the event of LF diseases as 13.8% of staff and 21.6% of students either will not or are unsure of accepting any vaccination against LF even when it becomes available. Staff (12.7%) and students (18.1%) were unlikely to allow their children to get immunized and accept such a vaccine in the event that they are affected by the disease. This may be attributable to the various side effects associated

Table 3 | A bivariate logistic regression showing the test of association between LF-associated stigmatization and sociodemographics, LF risk awareness, perception, and knowledge among students of the University of Benin (n = 300)[a]

Respondents	Category	Perceived stigmatization		95% CI		SE	OR	*p*
		High, *n* (%)	Low, *n* (%)	Lower	Upper			
Age (years)	Young adult	145 (90.6)	104 (88.1)	0.28	1.88	0.49	0.721	0.503
	Adult	15 (9.4)	14 (11.9)					
Sex	Male	66 (40.7)	65 (55.1)	1.06	3.10	0.27	1.814	0.029
	Female	96 (59.3)	53 (44.9)					
Education	Basic	132 (88.6)	95 (88.8)	0.58	3.54	0.46	1.44	0.431
	Higher	17 (11.4)	12 (11.2)					
Knowledge	Good	28 (17.3)	9 (7.6)	0.18	0.99	0.44	0.42	0.048
	Poor	134 (82.7)	109 (92.4)					
Risk awareness	High	74 (45.7)	49 (41.5)	0.48	1.42	0.27	0.84	0.518
	Low	88 (54.3)	69 (58.5)					
Risk perception	High	149 (93.1)	109 (93.2)	0.35	2.58	0.51	0.95	0.921
	Low	11 (6.9)	8 (6.8)					

[a]Total number of responses for each variable varied from the total number of respondents because of nonresponse. CI, confidence interval; LF, Lassa fever; OR, odds ratio; SE, standard error.

Table 4 | A bivariate logistic regression showing the test of association between LF-associated stigmatization and sociodemographics, LF risk awareness, perception, and knowledge among staff of the University of Benin (n = 300)[a]

Respondents	Category	Perceived stigmatization		95% CI		SE	OR	*p*
		High, *n* (%)	Low, *n* (%)	Lower	Upper			
Age (years)	Young adult	79 (73.8)	131 (78.9)	0.65	2.25	0.32	1.208	0.553
	Adult	28 (26.2)	35 (21.1)					
Sex	Male	48 (42.9)	86 (50.9)	0.88	2.52	0.27	1.492	0.135
	Female	64 (57.1)	83 (49.1)					
Education	Basic	15 (14.3)	16 (10.4)	0.27	1.32	0.41	0.591	0.199
	Higher	90 (85.7)	138 (89.6)					
Knowledge	Good	91 (81.3)	130 (76.9)	0.42	1.49	0.32	0.795	0.476
	Poor	21 (18.8)	39 (23.1)					
Risk awareness	High	70 (62.5)	119 (70.8)	0.74	2.25	0.29	1.287	0.377
	Low	42 (37.5)	49 (29.2)					
Risk perception	High	104 (97.2)	158 (96.3)	0.18	3.16	0.73	0.752	0.697
	Low	3 (2.8)	6 (3.7)					

[a]Total number of responses for each variable varied from the total number of respondents because nonresponse. CI, confidence interval; LF, Lassa fever; OR, odds ratio; SE, standard error.

Table 5 | Knowledge of Lassa fever (LF) prevalence, transmission, and predisposing factors among respondents (n = 600)[a]

Respondents	Staff, *n* (%)	Students, *n* (%)
Knowledge of LF prevalence		
Have you heard of LF?		
No	5 (1.7)	8 (2.7)
Yes	290 (96.3)	289 (96.0)
Not sure	1 (0.3)	3 (1.0)
What is the cause of LF?		
Virus	264 (87.7)	240 (79.7)
Bacterium	13 (4.3)	12 (4.0)
Animal	2 (0.7)	1 (0.3)
Witches/wizard	1 (0.3)	3 (1.0)
Not sure	14 (4.7)	34 (11.3)
What is the reservoir of LF virus?		
All rats	26 (8.6)	49 (16.3)
Long nose rat	59 (19.6)	68 (22.6)
House rat	5 (1.7)	8 (2.7)
Mastomys rat	188 (62.5)	146 (48.5)
Can rat transmit LF to man?		
No	29 (9.6)	24 (8.0)
Yes	233 (77.4)	242 (80.4)
Not sure	19 (6.3)	27 (9.0)

(*Continued*)

Table 5 | Knowledge of Lassa fever (LF) prevalence, transmission, and predisposing factors among respondents ($n = 600$)[a]—*Continued*

Respondents	Staff, *n* (%)	Students, *n* (%)
Knowledge of transmission of LF		
LF is transmitted through		
Contact with blood/secretions of infected rat		
No	137 (45.5)	98 (32.6)
Yes	164 (54.5)	203 (67.4)
Contact with urine/feces of infected rats		
No	99 (32.9)	96 (31.9)
Yes	202 (67.1)	205 (68.1)
Eating bush meat		
No	250 (83.1)	248 (82.4)
Yes	51 (16.9)	53 (17.6)
Eating rat meat		
No	243 (80.7)	201 (66.8)
Yes	58 (19.3)	100 (33.2)
Exposure to infectious body fluid and secretion		
No	168 (55.8)	162 (53.8)
Yes	133 (44.2)	139 (46.2)
Curses and spells		
No	282 (93.7)	283 (94.0)
Yes	19 (6.3)	18 (6.0)
Sexual intercourse		
No	273 (90.7)	270 (89.7)
Yes	28 (9.3)	31 (10.3)
Caring for LF patient		
No	201 (66.8)	233 (77.4)
Yes	100 (33.2)	68 (22.6)
Inhalation of viral particles		
No	242 (80.4)	237 (78.7)
Yes	59 (19.6)	64 (21.3)
Handling of corpses		
No	235 (78.3)	248 (82.4)
Yes	65 (21.7)	53 (17.6)
Knowledge of respondents on the predisposing factors to LF		
What factors predispose to LF?		
Residence or visit to rural areas		
No	255 (84.7)	265 (88.0)
Yes	46 (15.3)	36 (12.0)
Poor compliance to standard precautions		
No	139 (46.2)	180 (59.8)
Yes	162 (53.8)	121 (40.2)
Traditional handling of corpses		
No	243 (80.7)	258 (85.7)
Yes	58 (19.3)	43 (14.3)
Contact with persons infected with the disease		
No	148 (49.2)	185 (61.5)
Yes	153 (50.8)	116 (38.5)
Eating of rodent		
No	244 (81.1)	243 (80.7)
Yes	57 (18.9)	58 (19.3)
Insanitary disposal of waste		
No	199 (66.1)	189 (62.8)
Yes	102 (33.9)	112 (37.2)
Which age group is at risk?		
Children	5 (1.7)	18 (6.0)
Adult	6 (2.0)	1 (0.3)
Elderly	1 (0.3)	2 (0.7)
All age group	279 (92.7)	261 (86.7)

[a]Total number of responses for each variable varied from the total number of respondents because of nonresponse.

Table 6 | Assessment of Lassa fever (LF) risk awareness and perception among staff and students of the University of Benin (n = 600)[a]

Response	Staff, *n* (%)	Students, *n* (%)
Risk awareness		
Which age group is at risk?		
No response	9 (3.0)	18 (6.0)
Children	5 (1.6)	18 (6.0)
Adult	6 (2.0)	1 (0.3)
Elderly	1 (0.3)	2 (0.7)
All age groups	279 (93.0)	261 (87.0)
Is there currently an outbreak of LF in Edo State?		
No response	13 (4.3)	10 (3.3)
No	37 (12.3)	39 (13)
Yes	204 (68.0)	173 (57.7)
Not sure	46 (15.3)	78 (26.0)
Have you heard, seen or know anyone who suffered from LF?		
No response	5 (1.7)	14 (4.7)
No	225 (75.0)	224 (74.7)
Yes	70 (23.3)	62 (20.7)
Are vaccines available for treatment?		
No response	6 (2.0)	8 (2.7)
No	86 (28.7)	66 (22.0)
Yes	108 (36.0)	94 (31.3)
Not sure	100 (33.3)	132 (44.0)
Can LF be cured?		
No response	8 (2.7)	10 (3.3)
No	204 (68.0)	140 (46.7)
Yes	28 (9.3)	39 (13.0)
Not sure	60 (20.0)	111 (37.0)
Risk perception		
How do you feel about the possibility of LF infection?		
No response	12 (4.0)	6 (2.0)
Very seriously	227 (75.7)	209 (69.7)
Slightly serious	36 (12.0)	62 (20.7)
Not very serious	25 (8.3)	23 (7.7)
How serious is LF?		
No response	8 (2.7)	7 (2.3)
Very serious	249 (83.0)	230 (76.7)
Slightly serious	27 (9.0)	43 (14.3)
Not very serious	11 (3.7)	12 (4.0)
Not sure	5 (1.7)	8 (2.7)

[a]Total number of responses for each variable varied from the total number of respondents because of nonresponse.

with the current Ribavirin therapy [14] or other factors. Ribavirin has been associated with many adverse effects such as hemolytic anemia, nausea, and vomiting, myalgia, fatigue, diarrhea, abdominal pain, headache, jaundice, skin rash, tachycardia, and thrombocytopenia—all of which are known to be reversible. Although the questionnaire did not ask specifically for perceived unacceptance, this may be linked with LF misinformation and associated social stigmatization.

Results of this study showed that female students were potentially more likely to stigmatize against LF patients than their male counterparts in the event of an LF infection. Conversely, a study on the psychosocial impact of scars due to cutaneous leishmaniasis by Bennis et al. [26] reported that more females than males were more vulnerable to self-stigma and often expanded the effects of social-stigma associated with the disease. They, however, did not find a significant association between self-stigma and sex or personal experiences. The findings of our study and those of Bennis et al. [26] may indicate that females are not only vulnerable to self-stigma but are also more likely to stigmatize against others in the event of an epidemic with the high social impact such as LF. This may be related to the level of self-consciousness in sub-Saharan Africa and accentuated by the cultural roles of females in domesticity and the high value placed on social acceptance. Hence, comprehensive campaigns should focus on dissemination of accurate information of LF transmission and prevention particularly among females may be a first step toward tackling perceived LF stigmatization.

Additionally, adequate and accurate information about knowledge, attitude, and practices associated with LF disease remains poor as indicated by several studies conducted in Nigeria [29–31,34–37], which is consistent with the finding of this study. In this study, a higher proportion of LF-associated stigmatization was observed among students (57.9%), which generally demonstrated poor knowledge (82.7%) of LF transmission and prevention. By comparison, knowledge of LF disease was good among staff (81.3%), and they also demonstrated a perceived lower level of social stigmatization (39.9%) to LF disease. Poor knowledge was found to be significantly associated with the level of perceived social stigmatization to LF disease (p = 0.013). This demonstrates a strong association between knowledge of LF disease transmission and prevention, and LF-associated social stigmatization. This finding is consistent with that reported by Des Jarlais et al. [21], who found a significant association between lower level of education and endorsement of a variety of stigmatization methods for the control of SARS and AIDS. However, the low level

of education may simply reflect a generally poor knowledge about disease transmission and prevention.

5. CONCLUSION

The perceived stigmatization against LF in Nigeria is a grim reminder that the disease remains a public health threat. This study shows an association between perceived high level of LF stigmatization and poor knowledge of LF transmission. A comprehensive emergency response plan should incorporate accurate knowledge dissemination about the disease, its transmission, as well as available therapeutics as a first step toward tackling perceived LF stigmatization.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

REFERENCES

[1] World Health Organization. Lassa fever fact sheet [cited May 15, 2018]. http://www.who.int/mediacentre/factsheets/fs179 (accessed April 30, 2019).

[2] Sogoba N, Feldmann H, Safronetz D. Lassa fever in West Africa: evidence for an expanded region of endemicity. Zoonoses Public Health 2012;59;43–7.

[3] Gire SK, Stremlau M, Andersen KG, Schaffner SF, Bjornson Z, Rubins K, et al. Epidemiology. Emerging disease or diagnosis? Science 2012;338;750–2.

[4] Olugasa BO, Odigie EA, Lawani M, Ojo JF. Development of a time-trend model for analyzing and predicting case-pattern of Lassa fever epidemics in Liberia, 2013–2017. Ann Afr Med 2015;14;89–96.

[5] Ighedosa SU, Odigie AE, Usifoh SF, Asemota O, Asemota DO, Aighewi IT. Knowledge, attitude and practice of Lassa fever prevention by students of the University of Benin. J Sci Pract Pharm 2016;3;75–83.

[6] Mazzola LT, Kelly-Cirino C. Diagnostics for Lassa fever virus: a genetically diverse pathogen found in low-resource settings. BMJ Glob Health 2019;4;e001116.

[7] Oldstone MBA, Oldstone MR. Chapter 3 - Kenema Government Hospital: from Lassa to Ebola. In: Ebola's curse. 2013–2016 outbreak in West Africa, Elsevier Inc.; 2018, pp. 25–38.

[8] Nigeria Centre for Disease Control (NCDC). Press release: NCDC initiates response to rising Lassa fever cases in Nigeria. 2019. https://ncdc.gov.ng/news/163/press-release%3A-ncdc-initiates-response-to-rising-lassa-fever-cases-in-nigeria (accessed April 30, 2019).

[9] Centers for Disease Control and Prevention (CDC), National Center for Emerging and Zoonotic Infectious Diseases (NCEZID). Lassa fever. 2014. https://www.cdc.gov/vhf/lassa/transmission/index.html (accessed April 30, 2019).

[10] Rodas JD, Lukashevich IS, Zapata JC, Cairo C, Tikhonov I, Djavani M, et al. Mucosal arenavirus infection of primates can protect them from lethal hemorrhagic fever. J Med Virol 2004;72;424–35.

[11] Raabe V, Koehler J. Laboratory diagnosis of Lassa fever. J Clin Microbiol 2017;55;1629–37.

[12] McCormick JB, Fisher-Hoch SP. Lassa fever. Curr Top Microbiol Immunol 2002;262;75–109.

[13] McCormick JB, King IJ, Webb PA, Scribner CL, Craven RB, Johnson KM, et al. Lassa fever: effective therapy with ribavirin. N Engl J Med 1986;314;20–6.

[14] Bausch DG, Hadi CM, Khan SH, Lertora JJ. Review of the literature and proposed guidelines for the use of oral ribavirin as postexposure prophylaxis for Lassa fever. Clin Infect Dis 2010;51;1435–41.

[15] Cashman KA, Smith MA, Twenhafel NA, Larson RA, Jones KF, Allen RD, et al. Evaluation of Lassa antiviral compound ST-193 in a guinea pig model. Antiviral Res 2011;90;70–9.

[16] Pettit ML. Disease and stigma: a review of the literature. Health Educ 2008;40;70–6.

[17] Goffman E. Stigma: notes on the management of spoiled identity. Englewood Cliffs, NJ: Prentice-Hall; 1963.

[18] Perry P, Donini-Lenhoff F. Stigmatization complicates infectious disease management. Virtual Mentor 2010;12;225–30.

[19] Cunningham SD, Kerrigan DL, Jennings JM, Ellen JM. Relationships between perceived STD-related stigma, STD-related shame and STD screening among a household sample of adolescents. Perspect Sex Reprod Health 2009;41;225–30.

[20] Sayles JN, Wong MD, Kinsler JJ, Martins D, Cunningham WE. The association of stigma with self-reported access to medical care and antiretroviral therapy adherence in persons living with HIV/AIDS. J Gen Intern Med 2009;24;1101–8.

[21] Des Jarlais DC, Galea S, Tracy M, Tross S, Vlahov D. Stigmatization of newly emerging infectious diseases: AIDS and SARS. Am J Public Health 2006;96;561–7.

[22] Person B, Sy F, Holton K, Govert B, Liang A, Garza B, et al. Fear and stigma: the epidemic within the SARS outbreak. Emerg Infect Dis 2004;10;358–63.

[23] Ji D, Ji Y-J, Duan X-Z, Li W-G, Sun Z-Q, Song X-A, et al. Prevalence of psychological symptoms among Ebola survivors and healthcare workers during the 2014-2015 Ebola outbreak in Sierra Leone: a cross-sectional study. Oncotarget 2017;8;12784–91.

[24] De Roo A, Ado B, Rose B, Guimard Y, Fonck K, Colebunders R. Survey among survivors of the 1995 Ebola epidemic in Kikwit, Democratic Republic of Congo: their feelings and experiences. Trop Med Int Health 1998;3;883–5.

[25] Lehmann M, Bruenahl CA, Addo MM, Becker S, Schmiedel S, Lohse AW, et al. Acute Ebola virus disease patient treatment and health-related quality of life in health care professionals: a controlled study. J Psychosom Res 2016;83;69–74.

[26] Bennis I, Thys S, Filali H, De Brouwere V, Sahibi H, Boelaert M. Psychosocial impact of scars due to cutaneous leishmaniasis on high school students in Errachidia province, Morocco. Infect Dis Poverty 2017;6;46.

[27] Ehichioya DU, Hass M, Ölschläger S, Becker-Ziaja B, Onyebuchi Chukwu CO, Coker J, et al. Lassa fever, Nigeria, 2005–2008. Emerg Infect Dis 2010;16;1040–1.

[28] Cochran WG. Sample survey techniques; the estimation of sample size. 3rd ed., New York: John Wiley and Sons; 1977, p. 75.

[29] Odigie EA, Ighedosa SU, Osaghae VG, Usifoh SF, Asemota DO, Aighewi IT, et al. Risk perception of Lassa fever and rodent control practices in a university campus in South–South zone of Nigeria. Nigerian Soc Exp Biol J 2017;17;14–22.

[30] Usifoh SF, Ighedosa SU, Aighewi IT, Asemota OD, Odigie EA, Faboya T. Impact of Lassa fever on the practice and consumption

of stored food by University of Benin community, in Benin City, Nigeria. J Community Med Prim Health Care 2018;30; 66–76.

[31] Ighedosa SU, Asemota O, Aighewi IT, Odigie EA, Usifoh SF, Omorogbe CE, et al. Knowledge, attitude and prevention practices of Lassa fever by staff of University of Benin, Benin City. Nigerian Soc Exp Biol J 2017;17;82–90.

[32] Nigeria Centre for Disease Control (NCDC). Lassa fever outbreak in Nigeria. Situation Report No. 16: 24 January, 2016. https://ncdc.gov.ng/diseases/sitreps/?cat=5(name=An%20update%20of%20Lassa%20fever%20outbreak%20in%20Nigeria (accessed February 20, 2019).

[33] Nigeria Centre for Disease Control (NCDC). Lassa fever outbreak in Nigeria. Situation Report, 3rd February 2019. https://ncdc.gov.ng/diseases/sitreps/?cat=5(name=An%20update%20of%20Lassa%20fever%20outbreak%20in%20Nigeria (accessed February 20, 2019).

[34] Tobin EA, Asogun DA, Isah EC, Ugege OG, Ebhodaghe P. Assessment of knowledge and attitude towards Lassa fever among primary care providers in an endemic suburban community of Edo State: implications for control. J Med Med Sci 2013;4;311–8.

[35] Tobin EA, Asogun DA, Odia I, Ehidiamhen G. Knowledge and practice of infection control among health workers in a tertiary hospital in Edo State, Nigeria. Direct Res J Health Pharmacol 2013;1;20–7.

[36] Ekuma AE, Akpan IS. Lassa fever and infection control: knowledge, attitudes and practice in a university teaching hospital in Uyo, Nigeria. Ibom Med J 2017;10;40–7.

[37] Omotowo IB, Eyisi IG, Obi IE, Agwu-Umahi RO. Assessment of knowledge, attitudes and practices regarding Lassa fever among healthcare workers in a tertiary hospital, Enugu, South-East, Nigeria: implications for control. Joint Event on 2nd World Congress on Infectious Diseases & International Conference on Pediatric Care & Pediatric Infectious Diseases. Philadelphia: USA; 2016.