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Knowledge and risk factors for Lassa fever amongst students of Federal Polytechnic Auchi, Edo State, Nigeria

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Lassa fever (LF) is an acute, viral hemorrhagic illness which is common in West Africa. Students of tertiary institutions are also exposed to risk factors. Hence, the study aimed to assess the knowledge and risk factors for Lassa fever amongst students of the Federal Polytechnic Auchi, Edo State, Nigeria. This descriptive cross-sectional study was conducted among 240 undergraduate students of the Federal Polytechnic, Auchi, Edo State, Nigeria, between August and October, 2019. The participants included 240 respondents with mean age of 22.77±5.30 years, 147 (61.37%) females and 149 (62.1%) between 20-25 years. Most of the respondents 103(42.9%) were in their second year. Also, majority, 194 (80.8%) of them were aware of Lassa fever, but only 58 (29.6%) of them had knowledge of the disease. One hundred and thirty (67%) of them had high self-reported risk factors for LF. The most common risk factors for LF included: Poor hand-washing culture 176 (90.8%), inadequately covered food 175 (90.4%), lack of mouse proofs in places of residence 158 (81.3%) and bush burning 65 (33.8%). There was a statistically significant relationship between the age of respondents (p<0.001) and the knowledge of Lassa fever. From the study, more than four-fifth of the respondents were aware of LF, but only a third of them had knowledge of the disease. Thus, it can be seen that the common risk factors mentioned by the respondents cannot simply be glossed over. The State government and school authority should provide more risk communication messages through health workers and indigenous media.

Key words: Lassa fever, risk factors, knowledge, polytechnic, Auchi.

INTRODUCTION

Lassa fever (LF) is an acute, viral hemorrhagic illness caused by a single stranded RNA virus of the family arenaviridae.It was first identified in Lassa town of Borno State, North-East, Nigeria in 1969 (Buchmeier, 2007; Olise, 2016). This priority disease is endemic in West Africa with 3-5 million people infected yearly (Buchmeier,

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2007; Olugasa et al., 2015). There have been reports of outbreaks in Ivory Coast and in countries outside its region of endemicity (World Health Organization (WHO), 2014). LF is extremely virulent and often fatal with case fatality rates ranging from 1-15%. It may be as high as 20% in hospitalized patients; 50% during epidemics and 80% during the third trimester of pregnancy (WHO, 2017). An estimated 300,000 to 500,000 infections of Lassa fever occur annually, with approximately 5000 deaths in Nigeria and other endemic countries in West Africa (Usuwa et al., 2020). Recent data from Nigeria reveal that there were 1061 confirmed cases and 222 deaths between January to August 2020 (Nigeria Center for Disease Control, 2020). This was reported from 27 states and 129 LGAs across Nigeria, which included Edo, Ondo, Gombe, Taraba, Bauchi, Ebonyi, Anambra, Yobe, Rivers and Plateau States (Rine and Gyar, 2016; Nigeria Centre for Disease Control, 2020). The incidence of Lassa fever is usually highest during the dry season with outbreaks occurring during the period, but recent studies also reveal an all-year-round occurrence; especially in sub-Saharan Africa (WHO, 2018).

Lassa fever virus is transmitted to humans by rats of the species called *Mastomys natalensis*. This multi-mammate rat is the natural reservoir of the virus (WHO, 2017). The primary mode of transmission is from "rodent-to- human"; through the ingestion of food contaminated by their urine and excrement. Human to human transmission through contact with body fluid of an infected person is also common in the health care setting and among those caring for patients in the community (WHO, 2017). Those infected with the disease commonly present with fever, general weakness, headache, sore throat, muscle pain, cough, chest pain, nausea, vomiting, diarrhea, abdominal pain, and bleeding from the orifices. Common complications of the disease include: deafness, spontaneous abortion, hypovolemic shock, electrolyte imbalance, and renal failure (Federal Ministry of Health (FMOH), 2013; Olise, 2016).

Lassa fever is an epidemic prone disease and therefore requires immediate notification when suspected or diagnosed. The disease has an alert threshold of a single suspected case and an epidemic threshold of a single confirmed case (FMOH, 2013; Ossai et al., 2020). Common preventive measures for Lassa fever include frequent hand washing, personal and environmental hygiene, storing grains and other foodstuff in rodent proof containers, disposing of garbage far from homes and maintaining clean households. Ribavirin is the drug of choice for the treatment of LF and should be initiated before day 7 of the disease to reduce mortality. No vaccine is available for the disease (Olise, 2016; WHO, 2017).

Public awareness, knowledge of disease and its risk factors are very essential ingredients in its prevention and control (World Bank, 2009; Gobir et al., 2020). This study aimed to assess the knowledge and risk factors for Lassa fever amongst students of Federal Polytechnic, Auchi, Edo State.

MATERIALS AND METHODS

This was a descriptive cross-sectional study carried out among students of Federal Polytechnic, Auchi who resided in the hostels between August and October 2019.

This institution is located in Auchi, headquarter of Etsako West Local Government Area, Edo State, Nigeria. It is within Iyekhe quarters in the outskirts of Auchi. The other quarters/settlements include: Usogun, Akpekpe, Aibotse, Iyekhe and Egeleso. The school, which had a population of 10,343 in the 2018/2019 academic session is made up of two campuses, however, accommodation is provided for students only in the main campus. The students were enrolled in Business, Public Administration, Physical Sciences, Engineering, Environment, and Art courses. A total of about 3,270 students resided in the hostels (Etsako West Local Government Area, 2008). The hostels are divided into two zones; the northern and southern zones. The southern zone, which houses male students is made up of 5 hostels and the northern zone made up of 6 hostels. There is an average of 40-45 people to a hostel which is made up of 11 standard sized rooms. However, this number is usually exceeded by the students; through unhealthy arrangement among themselves (referred to as squatting) (Student Affairs Department, 2019).

The study participants included consenting students who had been legitimately assigned to these hostels for the 2018/2019 academic session.

The sample size was determined using Cochrane's formula for descriptive study involving a single independent proportion (Araoye, 2004).

$$n = Z^2pq / d^2$$

With a prevalence of knowledge of 17.2% from a previous study (Olayinka et al., 2015), Z_α of 1.96 at 95% CI, and a precision of 5%, a minimum sample size of 219 was calculated, but after correcting for non-response, a sample size of 240 was calculated.

Sampling technique

A multistage sampling technique was employed to administer the questionnaires to respondents.

Stage I: The first stage involved the selection of seven hostels from a total of 11 hostels in the institution using simple random sampling technique. Hence, four female and three male hostels were selected. Each of the hostels accommodated between 40-45 students.

Stage II: The second stage involved selection of all eligible students in each of the selected hostels, which were selected as clusters. Thus, all students in each hostel were selected until the minimum sample size was achieved.

Respondents' knowledge of LF was tested using 15 questions ranging from awareness of the disease, causative agent, mode of transmission, risk factors and preventive measures. A score of 1 was allocated to each correct answer and 0 for a wrong answer. Any respondent with a total score ≥ 70% had good knowledge of LF and those with a total score < 70% had poor knowledge of LF. In addition, 16 questions were used to investigate the respondents'

risk towards LF. A three-point Likert scale was used to assess the self-reported risk factors of the respondents for LF; a score of 3 was awarded to agree and a score of 1 to disagree. Also, a score of 2 was awarded for an indifferent response. The total score for each respondent was converted to percentage and classified as low risk (less than 50%); moderate risk (50-69%) and high risk (70% and above).

Respondents' comprehension of the tool was ascertained in a pretest, conducted with a small number of students, who were eventually excluded from the main study. Reliability of the tool was assessed by testing for internal consistency between the 3-point Likert-scale responses to 15 questions constituting respondents' risk towards LF. Cronbach's alpha was 0.81 (which represent high reliability).

Data collection and analysis

Data was collected using a pre-tested semi-structured self-administered questionnaire. Each questionnaire was divided into three sections: the first section was meant to obtain data on the socio-demographic characteristics of the respondents, the second was on respondents' knowledge of Lassa fever and the third was on self-reported risk factors towards LF disease.

Data was analyzed using the International Business Machines Corporation; Statistical Product and Service Solutions (IBM SPSS) for windows version 20 (IBM Corp. Armonk, NY). Tables and graphs were used to illustrate the relationship and averages of socio-demographic variables; while chi-square test was used to test for association between the knowledge of Lassa fever, risk factors and socio-demographic variables. The level of statistical significance was determined by p-value of <0.05.

Ethical approval

Ethical approval (with approval number: 007/19) was obtained from Ethics and Research Committee of Ambrose Alli University, Ekpoma, Edo State, Nigeria. Institutional approval was also obtained from the management of Federal Polytechnic, Auchi and written informed consents were obtained from the participants before the administration of the questionnaires. Respondents' confidentiality was also ensured.

RESULTS

Table 1 shows the socio-demographic characteristics of the respondents. A total of 240 participants were interviewed during the study. A greater proportion, 149 (62.1%) of them were within the ages of 20 – 25 years. The mean age of the respondents was 22.77± SD 5.30. Most of the participants, 147 (61.3%) were females and 70 (29.2%) of them were from Etsako, 67 (27.9%) from Esan and 23 (9.6%) were from Owan. In addition, majority of the respondents, 193 (80.4%) were Christians. One hundred and three (42.9%) were in their second year of the National Diploma (ND2) followed by those in their first year of Higher National Diploma (HND1). Also, a greater proportion of the respondents 100 (41.7%) were in the Department of Science Laboratory Technology (SLT).

Table 2 reveals respondents' knowledge of LF. A greater proportion of the respondents, 194 (80.8%) had heard of Lassa fever. Out of these, 58 (29.6%) were able to identify what caused the disease. Also, 157 (81.2%) of the respondents were able to correctly identify the vector that transmits the disease. A greater proportion, 184 (95.0%) of the respondents stated that contaminated food facilitated the transmission of LF; but only 75 (38.8%) of the respondents identified the average incubation period for LF. Majority of the respondents were able to state the common symptoms of LF, which included fever 166 (85.8%), body weakness 166 (85.8%), headache 129 (66.7%) and bleeding 61(31.7%).

The sources of information on LF are illustrated in Table 3. A higher proportion of the respondents, 81 (41.7%) heard of Lassa fever in the school, 68 (35.1%) of them heard of it from friends and relatives, 23 (11.9%) from Health Care Workers and 22 (11.3%) from the television/mass media.

Figure 1 illustrates the aggregate knowledge of respondents on Lassa fever disease. Over half, 151 (62.9%) of the respondents had poor knowledge whereas 89 (37.1%) had good knowledge of Lassa fever disease.

Table 4 displays responses from respondents on risk factors for LF. Fifteen questions concerning self-reported risk factors for Lassa fever were asked. Most, 176 (90.8%) of the respondents stated that poor hand washing increased the risk of contracting Lassa fever, 175 (90.4%) of the respondents opined that inadequately covered food could predispose to LF, however, only 36 (18.8%) believed that the consumption of rats may predispose them to LF. Also, a lower proportion of the respondents 45 (23.2%) stated that they were not bothered when they saw rats in the hostel. One hundred and fifty-eight (81.3%) of the respondents reported that lack of mouse proofs in the hostels could predispose them to LF while 65 (33.8%) stated bush burning as risk factor for LF.

Only 8 (4.2%) of the respondents stated that lack of medical attention after 3 days of unremitting fever could predispose to LF. As regards environmental risk factors for LF, majority of the respondents, 158 (81.7%) stated that untidy rooms in the hostel could be a risk factor for LF; however, 18 (9.2%) do not believe that a poorly arranged room could increase the risk of contracting the disease. Furthermore, majority of the respondents, 168 (86.7%) believed that having holes in the doors, windows and walls increased the risk of contracting LF. Only 46 (23.8%) of the respondents stated that failure to pray increased the risk of contracting LF.

Figure 2 shows that one hundred and thirty (67%) of the respondents had self-reported high risk while 38 (20%) and 25 (13%) had moderate and poor risk towards LF respectively.

Table 5 is a cross-tabulation between the socio-demographic characteristics of the respondents and their

Table 1. Socio-demographic characteristics of respondents.

Variable	Frequency (n=240)	%
Age group [+]		
< 20 years	58	24.2
20 – 25 years	149	62.1
26 – 30 years	10	4.2
> 30 years	23	9.6
Sex		
Male	93	38.8
Female	147	61.3
Ethnicity		
Etsako	70	29.2
Bini	70	29.2
Esan	67	27.9
Owan	23	9.6
Others*	10	4.2
Religion		
Christianity	193	80.4
Islam	47	19.6
Year of study (Level)		
ND 1	48	20.0
ND 2	103	42.9
HND 1	56	23.3
HND 2	33	13.8
Department		
Science Laboratory Technology (SLT)	100	41.7
Public Administration	35	14.6
Business Administration	34	14.2
Electrical Engineering	24	10.0
Mechanical Engineering	24	10.0
Banking and Finance	12	5.0
Mathematics	11	4.6

[+]=Mean±SD=22.77±5.30; *=Yoruba: 6 (2.5%); Efik: 2 (0.83%); Urobo: 2 (0.83%).

knowledge of Lassa fever disease. There was a statistically significant relationship between the age group of respondents ($p<0.001$) and the knowledge of Lassa fever. Those within the ages of 20-25 years had significantly better knowledge of Lassa fever.

DISCUSSION

Four-fifth of the respondents in this study were aware of LF but 37.1% of them had knowledge of the disease. The high level of awareness was not unexpected from students of a tertiary institution in Nigeria. However, the knowledge gap demonstrated in this study may have resulted from the varied background of the students of this institution; with the respondents coming from various regions across the country. Those, specifically with poor knowledge on LF may have come from non-endemic communities in Nigeria. It reflects the fact that there are still some regions in Nigeria where people have not heard anything about LF. The level of awareness demonstrated in this study is comparable to results from a previous

Table 2. Respondents' knowledge of Lassa fever.

Question	Response		
	Yes (%)	**No (%)**	**Total (%)**
1.Have you heard of Lassa fever before	194 (80.8)	46 (19.2)	240 (100)
	Correct (%)	**Wrong (%)**	**Total (%)**
2. What causes Lassa fever?	58 (29.6)	136 (70.4)	194 (100)
3. Lassa fever is a contagious disease	157 (80.8)	38 (19.2)	194 (100)
4. What vector transmits the disease?	157(81.2)	36(18.8)	194(100)
5. Lassa fever is transmitted through what means?			
Food/water contaminated with urine/faeces of the vector	184 (95.0)	10(5.0)	194(100)
Respiratory droplets from infected persons	90 (46.3)	104(53.8)	194 (100)
Blood and Body fluids of infected persons	137 (70.8)	57(29.2)	194 (100)
6. What is the incubation period of Lassa fever?	75 (38.8)	119 (61.2)	194 (100)
7. The following are symptoms/signs of Lassa fever?			
Fever	166 (85.8)	28 (14.2)	194(100)
Vomiting	149 (76.7)	45 (23.3)	194 (100)
Headache	129 (66.7)	65 (33.3)	194 (100)
Body weakness	166 (85.8)	28 (14.2)	194 (100)
Bleeding	61 (31.7)	132 (68.3)	194(100)
8. What types of people are affected?	159 (82.1)	35 (17.9)	194 (100)

Table 3. Source of information of respondents.

Source of information	Frequency (n=194)	%
School	81	41.7
Friends/Relatives	68	35.1
Health care workers	23	11.9
Television/mass media	22	11.3

study carried out in a rural community in South East Nigeria (Ekanem et al., 2018) in which 90.8% of the respondents were aware of Lassa fever. Similar findings concerning both awareness and knowledge of LF had been reported by Tobin et al. (2013) where 97 and 38.9% of the respondents were aware and had knowledge of LF respectively. Similar observation was also reported by Ighedosa et al. (2016) and Usuwa et al. (2020), but a contrasting result was obtained from Ondo State, Nigeria (Ilesanmi et al., 2015) where only 17.2% of the respondents were aware of LF.

As regards content of the knowledge on LF, about a third of the respondents had adequate information about LF disease. Among them, 29.6% knew the causative organism and 81% correctly identified the vector involved in the transmission of the disease. The apparent knowledge gap with respect to the causative organism is worrisome and may not be unconnected to the sources of information on LF. This fact is underscored by the finding that only 11.9% of the respondents in this study had received information on LF from health workers. Also, the health workforce has been reported to give the most accurate information about common diseases (Usuwa et al., 2020). However, this finding is at variance with results from a previous study carried out in South East Nigeria, in which 68.1 and 67.4% of the respondents were able to identify the causative organism and mode of transmission of LF (Ossai, 2020) but was similar to another

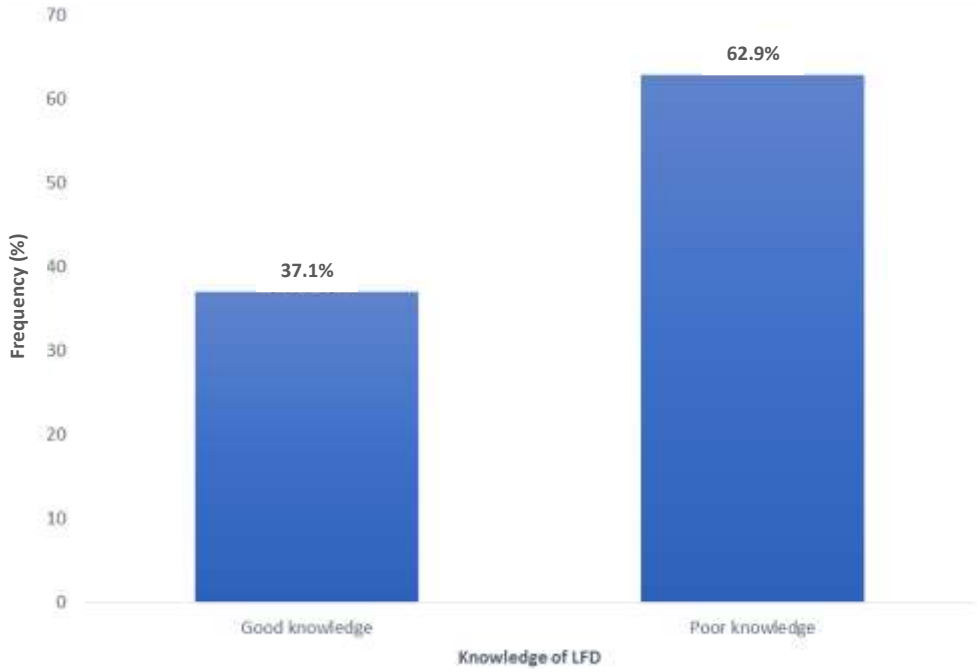

Figure 1. Aggregate knowledge of respondents on Lassa fever.

Table 4. Self-reported risk factors for Lassa fever.

Risk factor	Response		
	Agree (%)	Indifferent (%)	Disagree (%)
1. Poor hand washing habits	176 (90.8)	0 (0.0)	18 (9.2)
2. Inadequately covered food	175 (90.4)	10 (5.0)	9 (4.6)
3. Rats and mouse considered a delicacy	36 (18.8)	19 (9.6)	139 (71.7)
4. Not bothered when one sees rats in hostel	45 (23.2)	10 (4.6)	139 (72.1)
5. Lack of mouse proofs in the hostel	158 (81.3)	19 (9.6)	17 (9.2)
6. Bush burning	65 (33.8)	43 (22.5)	85 (43.8)
7. Infected persons not isolated	148 (76.3)	18 (9.2)	28 (14.6)
8. Immediate contact of infected persons not quarantined	177 (91.3)	17 (8.8)	0 (0.0)
9. Lack medical attention after three days of unremitting fever	168 (86.7)	18 (9.2)	8 (4.2)
10. Environmental risk factors			
a) Untidy rooms in hostel	158 (81.7)	17 (8.8)	19 (9.6)
b) Poorly arranged items in the rooms.	168 (86.7)	10 (4.2)	18 (9.2)
c) Holes on doors, windows and walls	168 (86.7)	10 (4.2)	22 (9.2)
d) Food not kept in rodent proof containers	219 (91.3)	10 (4.2)	11 (4.6)
e) Failure to wash fruits before eating	207 (86.3)	10 (4.2)	23 (9.6)
f) Failure to pray	57 (23.8)	56 (23.3)	127 (52.9)

observation from Northern Nigeria (Gobir et al., 2020) where 21% of the respondents had a good knowledge of the causative organism for LF.

As per sources of information, about four-fifth of the respondents received information on LF from the classroom and among colleagues; as well as during lectures in the school. Mass media (especially television) was the least source of information. Indeed, this pattern reflects the major routines of the students when school is in session. More time is spent in in classroom and less

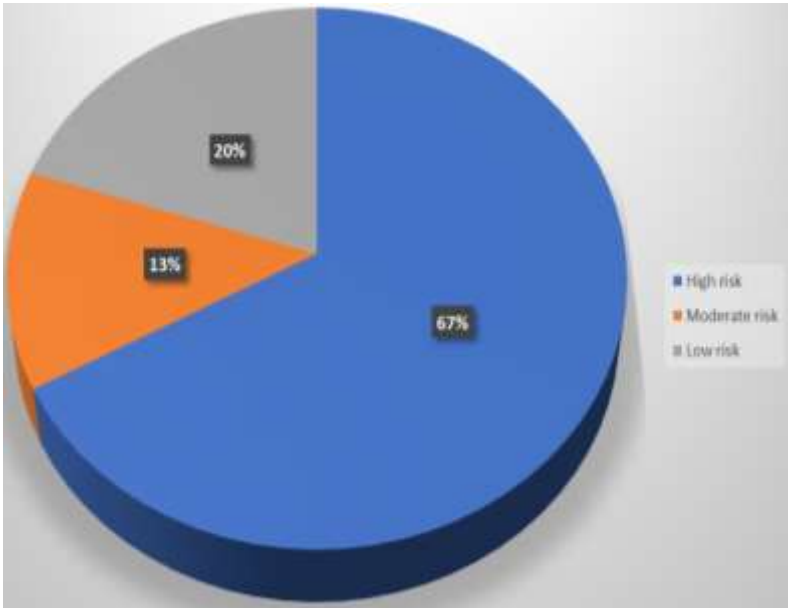

Figure 2. Overall risk score among respondents.

Table 5. Socio-demographic characteristics and knowledge of Lassa fever amongst respondents.

Demographic variable	Knowledge of respondents			
	Good (%)	Poor (%)	χ^2 / df	p-value
Age group (years)				
< 20	11 (22.9)	37 (77.1)		
20 – 25	68 (45.6)	81 (54.4)		
26 – 30	9 (100)	0 (0.0)	Fisher's Exact	**<0.001**
> 30	1 (4.5)	23 (95.5)		
Total	89 (39.0)	139 (61.0)		
Sex				
Male	34 (36.6)	59 (63.4)		
Female	55 (37.4)	92 (62.6)	0.018/1	0.894
Total	89 (37.1)	139 (57.9)		
Year of study (Level)				
ND 1	24 (50.0)	24 (50.0)		
ND 2	32 (31.1)	71 (68.9)		
HND 1	23 (40.4)	34 (59.6)	5.949/3	0.114
HND 2	10 (30.3)	23 (69.7)		
Total	89 (37.1)	151 (62.9)		

time is devoted to obtaining information from the mass media; hence only about 11.3% of the respondents stated that mass media was their source of information on LF. However, in previous studies carried out in Nigeria (Nwonwu et al., 2018; Ossai et al., 2020; Usuwa et al., 2020), mass media was reported to be the major source of information.

In terms of factors associated with knowledge of LF, there was a statistically significant relationship between the age of respondents ($p<0.05$) and knowledge of LF.

Those within the ages of 20-25 years had significantly better knowledge of Lassa fever than others. This finding is in keeping with a previous report by Ossai et al. (2020) in which respondents who were less than 35 years of age had significantly better knowledge of LF. Nevertheless, contrasting results have been reported from another study carried out in South-South Nigeria (Tobin et al., 2013), where respondents older than 25 years had better knowledge of LF.

The overall self-reported risk demonstrated in this study shows that two-third of the respondents had a higher risk of contracting LF. However, 20% of the respondents reported lower risk factors for LF. Among the self-reported risk factors for LF, majority (90.8%) of the respondents reported that poor hand washing could predispose individuals to LF. This view may have been influenced by the repeated general messages on the media across the country on the prevention and control of communicable diseases by the Water and Sanitation Hygiene (WASH) programme, under the auspices of UNICEF in Nigeria (Etsako West Local Government Area, 2008). Furthermore, 18.8% of the respondents stated that consumption of rats as a delicacy was a risk factor for LF. This practice is linked to some cultural practices in LF endemic communities. Nonetheless, 23.2% of the respondents reported that they were not bothered about the presence of rats in the hostels while 33.8% of them considered bush burning as a risk factor for LF. The lack of concern of the presence of rats and bush burning demonstrated in this study may have been influenced by lack of information on the mode of transmission of the disease and some persistent cultural values within the Lassa endemic communities; which include bush burning and the hunting of rats for consumption as a delicacy (Usuwa et al., 2020). Furthermore, about three-quarter of the respondents reported that uncovered food was a high predisposing factor to LF. This was very impressive and very protective of the entire study population. It concurs with a previous report (Ilesanmi et al., 2015), in which 76.2% of the respondents reported it to be a source of transmission of the virus. The presence of holes on doors, walls and roofs of houses were also identified as major risk factors for LF. This is in conformity with a previous report by Aigbiremolen et al. (2017) in which 83% of respondents stated that intact roofs and walls were risk factors for LF; and also conforms with other results from community studies in Nigeria (Tobin et al., 2013, 2015).

Limitations

This study was institution-based; so, the findings may not be applicable to the generality of the population. Furthermore, because of the transient nature of the students, follow up is cumbersome.

Conclusion

The respondents' knowledge of LF was poor, but over four-fifth of them were aware of it. The participants' self-reported risk factors for the disease included: poor hand washing, inadequately covered food and bush burning. Knowledge of LF had a statistically significant relationship with the age of the respondents ($p<0.001$).

Therefore, preventive measures towards LF should include risk communication messages through health workers and indigenous media channels directed at the students by the school authority and state government.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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