Knowledge, attitudes and practices (KAP) regarding Lassa fever disease among adults in endemic and non-endemic Counties of Liberia, 2018: A Cross-sectional study

KEYWORDS: Lassa fever, KAP, Endemic and Non-endemic Counties, Liberia

Darius Dolopei[1,2,&], Maame Amo-Addae[3,4], Peter Adewuyi[3,4], Himiede Wilson[3,4], Fulton Shannon[4], Jimmy Lawubah[1,5], Ophelia Woods[1,6], Oscar Gbearr[1,7], Vivian Kemah Deodeh[1,8], Austine Sanley[1,9], Miatta Wright Kullie[1,10], George Tamatia[1,8], Jacob Muyan[1,11], Lincoln Gbabow[1,2], Torwon George Bunnah[1,12], Allakemanie Sackie[1,13], Harrison Duo[1,14], Darius Leyhen[1,9], Edwin Paye[3,13], Phebe Thomas[1]

[1]National Public Health Institute of Liberia/Ministry of Health, [2]Lofa County Health, Liberia, [3]African Field Epidemiology Network, [4]Liberia Field Epidemiology Training Program, [5]Grand Kru County Health, Liberia, [6]Nimba County Health, Liberia, [7]Grand Gedeh County Health, Liberia, [8]Sinoe County Health, Liberia, [9]Rivercess County Health, Liberia, [10]Margibi County Health, Liberia, [11]Gbapolu County Health, Liberia, [12]Grand Bassa County Health, Liberia, [13]Bong County Health, Liberia, [14]Maryland County Health, Liberia

[&]CORRESPONDING AUTHOR
Darius Dolopei, National Public Health Institute of Liberia/Ministry of Health, Monrovia, Liberia.
dariusdolopei46@gmail.com

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ABSTRACT

Introduction: Lassa fever (LF) causes significant morbidity and mortality worldwide with estimated 3-5 million individuals being infected yearly. In West Africa, the disease is endemic in Nigeria, Sierra Leone, Guinea and Liberia. Liberia recorded its first outbreak in 1972. We determined knowledge, attitudes, and practices (KAP) toward LF disease, to identify practices related to LF transmission, determine differences in KAP and to identify factors associated with LF among adult populations in endemic and non-endemic counties of Liberia. **Methods:** We conducted a cross-sectional study among 858 respondents in all 15 counties in Liberia. A combination of probability sampling techniques were used to obtain the desired sample size. We used electronic semi-structured questionnaires for data collection. We summarized data using counts, proportions, 95%CI and Chi-square. **Results:** Of the 858 respondents from all 15 counties in Liberia, only 24(3%) had good knowledge generally about LF management (*P-value=0.02*), 250(29%) had a positive attitude towards LF (*P-value=0.6*), and 217(25%) carried out good LF-related practices (*P-value=0.1*). A higher level of education was associated with good knowledge and positive attitudes in endemic and non-endemic counties. (*P-value=0.01*). **Conclusion:** KAP of LF was low in both endemic and non-endemic counties. There was no difference seen in attitudes and practices among endemic and non-endemic counties. We recommended that Ministry of Health and National Public Health Institute of Liberia increase awareness of LF in Liberia and work with the Ministry of Education to introduce modules on LF in all schools.

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Introduction

Lassa fever (LF) is an acute viral haemorrhagic illness caused by the Lassa virus, a single-stranded RNA virus [1]. The first case of LF was identified in 1969 in Lassa Village, Nigeria [1,2] and has been endemic in the West African sub-region namely, Nigeria, Sierra Leone, Guinea, and Liberia. Lassa fever is highly contagious; it is transmitted to humans via contact with or consumption of infected "multimammate rats"(Mastomys natalensis) [3]. Person-to-person transmission of Lassa fever is also possible through contact with infected human body fluids [3]. LF is estimated to infect 3 to 5 million individuals yearly and often results in death [4]. Case fatality rate of Lassa fever globally is 1-16% [5] . In Liberia, one confirmed case of LF is an outbreak but cases are usually difficult to identify because the initial signs and symptoms are common to other common viral and bacterial infections such as typhoid, malaria and other viral haemorrhagic diseases such as Ebola [6]. The common signs and symptoms include vomiting and diarrhoea, sore throat, retrosternal pain, conjunctivitis, petechial haemorrhage, abdominal pains, and bleeding from orifices [6,7]. However, LF is suspected in patients who present with fever (>38°C) who do not respond to antimalarial and antibiotic treatment [6]. Multiple organ damage and sensorineural hearing loss are some complications associated with LF [8].

Liberia recorded its first LF outbreak in 1972 [9] and has since recorded outbreaks almost every alternate year [10]. Although LF is endemic in Liberia, it is commonly reported from the northern part of the country [11]. However, it has spread to non-endemic southward counties [11,12,13]. The 2018 outbreaks in Liberia affected Nimba and Bong Counties in the LF-endemic North-central Region, as well as Montserrado and Margibi Counties in the non-endemic Southern Region without any established epidemiological link to the endemic areas. This raises concern about the possibility of new outbreaks in historically non-endemic areas. The situation suggests that the entire population is possibly at risk. In the absence of targeted interventions, there may be continued and increased intensity and severity of LF outbreaks with progressive spread of disease endemicity into the non-endemic southern part of Liberia [13]. The status of LF in Liberia therefore calls for prioritization of interventions for its control including efforts to increase the awareness of the population through health campaigns, and discouragement of practices that increase the spread of both the vector and the virus.

The adult population in Liberia forms 54% of the total Liberian population [14,15] and form a critical target group in efforts to promote healthy behaviour. There is the need to characterise the current/baseline knowledge, attitudes, and practices (KAP) regarding LF among this population to institute appropriate interventions aimed at improving awareness and promoting healthy behaviour. Such information has not been scientifically obtained in Liberia to date. We expect that findings from this survey would provide this information for action.

The objectives of the study were to determine the level of knowledge about Lassa fever, describe attitudes toward Lassa fever, identify practices related to Lassa fever transmission, and to determine difference in knowledge, attitudes, and practice (KAP) between endemic and non-endemic counties in Liberia. In addition, we sought to identify factors associated with knowledge, attitudes and practices toward the prevention of Lassa fever among the adult population in endemic and non-endemic counties of Liberia.

Methods

Study setting

Liberia has an estimated population of 4,837,180 and is located in West Africa, surrounded by Guinea, Sierra Leone and the Ivory Coast [15]. Liberia is divided into 15 political sub-divisions called counties, with each county sub-divided into a total of 92 health districts, with 866 health facilities [15, 16]. The lowest geographic unit in Liberia is the community/village; within each community are households. The country can be divided into LF endemic and non-endemic regions and counties Figure 1.

Study design

We conducted a cross-sectional study.

Study population

The study was conducted among adults aged 18 and above, residing in both endemic and non-endemic LF counties. The estimated adult population in Liberia was 2,634,292 [15].

Sample size and sampling technique

Based on the objective of the survey, we stratified the country at the county level into the two LF regions; endemic and non-endemic. Applying a modified WHO 30 X 14 cluster sampling technique in each stratum, we obtained a desired sample size of 420 for each stratum, giving a total of 840 respondents. To obtain this sample, we conducted a multistage sampling for districts, communities, households and respondents in both endemic and non-endemic regions of the country.

Selection of districts and communities

Within each stratum, we listed all the districts with their population sizes. Using probability proportionate to size, we selected 30 districts each from the endemic and non-endemic regions. Within each district selected, we randomly selected 30 communities by balloting, making a total of 60 communities across both strata. The communities were our clusters.

Selection of respondents

After the selection of clusters, we selected 14 respondents within each cluster from households. To do this, we used systematic random sampling to select the household, by marking the largest government health facility in that community as the starting point. Where the community had no health facility, the starting point was the market. We then selected the fifth house away in the southward direction until there were no more houses in that direction, then the houses were selected westward, then eastward in a zigzag fashion. A total of 14 houses were selected in each cluster.

One person was interviewed per household based on the selection criteria (a consenting adult aged 18 years and above). If more than two persons met the selection criteria in a household, one respondent was randomly selected by balloting from the list of two eligible respondents for an interview.

Variables

We obtained the following independent variables for analysis: age, sex, marital status, occupation, educational status, county of residence and monthly income. The outcome variable was LF KAP status of the counties in Liberia. We set up criteria (described under data analysis below) to measure good or poor knowledge, positive or negative attitude and good or poor practice of respondents.

Data collection technique and tool

We used electronic semi-structured questionnaire-built-in tablets for data collection. The data collection instrument consisted of six parts: Informed consent (paper based), Identifiers, Demographics, Knowledge, Attitudes, and Practices of LF.

Data management and analysis

Total of 24 questions excluding socio-demographic characteristic section were administered to respondents. There were seven questions in the knowledge section of the questionnaire. A correct answer was given a score of 1 and incorrect answer scored 0. The total score under the knowledge section therefore varied from 0-7 points and were classified as good level of knowledge if the score generated was greater than or equal to 5, and score less than 5 was classified as poor level of knowledge. There were eight questions in attitude section of the questionnaire. A correct answer was given a score of 1 and incorrect answer scored 0. The score varied from 0-8 was classified as positive attitude if score greater than or equal to 5, and negative attitude if otherwise. There were nine questions in practice section of the questionnaire. Similarly, with a correct answer scored 1 and incorrect answer scored 0, a total score of six or more was classified as good practice, and poor practice if less than six **Table 1**.

We cleaned our data using excel filters and analysed our data using counts, proportions, prevalence odds ratios at 95% confidence interval. Significance of differences in knowledge, attitudes and practices across sub-groups (endemic and non-endemic regions) was determined using chi-square test.

Ethical considerations

We obtained clearance from the Institutional Review Board (IRB) for the study protocol from the Liberia Medical Review Board and written consent from respondents.

Results

A total of 858 respondents participated in the survey, with 416 (48%) and 442 (52%) from endemic and non-endemic regions respectively Table 2.

Knowledge about Lassa fever disease among endemic and non-endemic counties

Overall, 65% (554/858) of the study participants reported to have already heard of LF, with 52% (289/554) from endemic counties. The main source of information on LF was the radio, 47% (263/858). A total of 64% (370/582) of all respondents named rodents (rats) as the source of LF infection with 59% (219/370) from endemic counties. Thirty percent (256/858) of the respondents mentioned consuming food/drink contaminated by rodent excreta (urine and faeces) as one way a person could get LF, with 60% (153/256) from endemic counties. The most identified signs and symptoms of LF among all respondents were fever (>38°C) that is unresponsive to anti-malarial and antibiotics; 19% (164/858), vomiting; 10% (86/858), and bleeding from orifices; 9% (78/858). The most common ways respondents knew to prevent LF were proper and safe food storage, 28% (236/858) and maintenance of clean environment, 16% (133/858). Overall, 59% (297/504) of respondents reported that LF could be cured with 54% (159/297) respondents from non-endemic counties. Only 3% (24/858) of respondents in both endemic and non-endemic counties had good knowledge generally about LF with a higher proportion of 4% (17/416) in the endemic region (Table 3).

Attitudes toward Lassa fever disease in endemic and non-endemic counties

Overall, 52% (442/858) of the respondents believed they are at risk of getting LF; with 52% (231/442) in the non-endemic counties. Among those who believed that they are at risk, 32% (141/442) of the respondents said they might be at risk of contracting LF because they live in rat-infested areas, with 49% (70/141) in endemic counties. Twenty four percent (128/538) of the respondents believed that a person could have LF but not show signs and symptoms; with endemic counties accounting for 56% (72/128). Among those who responded to this question, 95% (547/577) cited health facility to be the first point of contact for treatment if someone has LF; with 52% (282/547) of them from endemic counties. Respondents who said they would provide care for a person sick with LF accounted for 78% (417/533); with just over half of them from non-endemic counties 53% (223/417). The most common type of care people would provide to a person sick with LF was feeding 10% (86/858). Respondents with higher education were more likely to have positive attitudes toward LF Table 3. Overall, 29% (250/858) of the respondents had positive attitude toward LF Table 3,Table 4, Table 5 .

Practices related to Lassa fever prevention in endemic and non-endemic counties

Overall, 96% (818/851) of respondents reported having rodents (rats) in or around their homes, 49% (401/818) from non-endemic, and 51% (417/818) from endemic counties. All (858/858) respondents reported having taken action against the existence of rodents in or around their homes. The most common action taken to control rodents was the use of rodenticide 37% (317/858); with highest proportions 93% (295/317) from endemic counties. Storing dried food in sealed container was done by 53% (453/858) of the respondents with 55% (247/453) of them being resident in non-endemic counties. Among 623 respondents, 81% (502/623) indicated that they would discard food that rats had come into contact with. Out of these, 54% (272/502) were from non-endemic counties. Almost 13% (104/800) of the respondents admitted that they consume rodents (rats), with majority, 64% (67/104) from endemic counties. The health facility was the first point of contact for treatment if a person was suspected of LF for 96% (825/855) of all respondents. Only 25% (217/858) of the respondents across the country had good practices, evenly distributed in endemic and non-endemic counties Table 3,Table 4, Table 5 .

Discussion

We found that majority of the respondents had already heard of LF in both endemic and non-endemic counties. This contrasts findings by Ilesanmi et al, a study conducted in Nigeria with less than 20% respondents reporting to have never heard of LF [17]. Radio was the main source of information in endemic counties compared to non-endemic counties. A similar finding was seen in a study conducted by Ilesanmi et.al in Nigeria with the mass media being the main source of information for LF [17, 18]. Rodents (rats) were the most common cause of LF with the highest proportion of respondents from endemic counties as compared to non-endemic counties. Similar to our findings, respondents from a study done by Reuben and Gyar in Central Nigeria cited food contaminated by rodent excreta as a major means by which Lassa fever is transmitted to humans [18, 19]. Fever (>38°C) that is unresponsive to anti-malarial medicines and antibiotics was the most recognized symptom by respondents. The study conducted by Omotoso et.al in South West Nigeria also stated fever >38°C as the commonest symptom recognized by respondents [19, 20].Similar study conducted Akinwumi and Ademola 2016 also revealed that fever(>38°C) was the most common symptoms recognized by respondents [21]. Proper and safe food storage and maintenance of a clean environment were the most common ways of preventing LF in endemic and non-endemic counties. Akinwumi and Ademola 2016 also found that proper and safe food storage and maintenance of a clean environment were the most common ways to prevent LF[21,22]. Low percentage of knowledge about LF among endemic and non-endemic counties, is a clear manifestation to the Liberia Ministry of Health to intensify awareness across the country on preventive and control measures on LF.

Awareness of being at risk of getting LF was approximately equal in distribution in both endemic and non-endemic counties. This might indicate to the fact that some level of awareness have been created in both endemic and non-endemic counties especially on LF risk factors. Respondents believe that a person can have LF but not show signs and symptoms; this was a common attitude among endemic and non-endemic respondents.

Majority of the respondents mentioned the health facility as the first point of contact if someone had LF, with this practice being mutual in endemic counties. This findings was also similar to what was seen in study conducted by Faith and Harrison 2019 Edo State, Nigeria [22]. In addition, the practice of providing care for a person sick with LF was commoner in non-endemic counties compared to endemic counties. It might appear that people in endemic areas prefer to have minimal contact with LF patients compared to non-endemic areas. For our study, respondents with higher knowledge about LF were more likely to have positive attitudes toward LF compared to others. Generally, attitudes to LF was poor among respondents. The possible explanation could be due to poor opinion of thought toward LF by people living in both endemic and non-endemic counties.

Most of the respondents in endemic and non-endemic counties reported having rodents (rats) in or around their homes; with most coming from non-endemic counties. This was similar to what Olalekan found in his studies, when only 9% of his respondents reported not have seen any rodents (rats) in or around their homes [23]. Most respondents in endemic and non-endemic counties reported rodenticide as control action for rodents (rats). Contrary to our findings, Olalekan found proper covering of food and water as the most common action against control [23]. Storing dried food in sealed containers was more commonly practiced in non-endemic counties compared to endemic counties. This could be one of the contributing factors to the incidence of LF outbreaks in endemic counties. Compared to endemic counties, people in non-endemic counties tended to throw away food that rodents (rats) had come into contact with. This good practice was less common in endemic areas, which may also contribute to higher rates of infection amongst the inhabitants. Apparently, this could still be one of the reasons why LF outbreaks continue to occur in endemic counties. A high proportion of our study respondents, both in endemic and non-endemic areas, admitted to consuming rats (rodents). This finding is contrary to that of Reuben and Gyar where few respondents fed on rodents (rats) [23]. Even though the species of rodents (rats) eaten by respondents in endemic counties remain unknown, that number might still contribute to the continuous LF existence in endemic counties.

There was a difference in knowledge about LF in endemic and non-endemic areas; but with no difference in attitudes and practices toward LF in endemic and non-endemic counties. Being male with higher education was significantly associated with good knowledge about LF compared to being female. This could possibly be due to the fact that males are likely to be more educated than females in Liberia. Respondents living in an endemic region contributed to good knowledge and positive attitudes toward LF compared to those living in non-endemic region. This could be due to the fact that due to continuous outbreaks in endemic counties, the inhabitants are getting to know about LF infection. Good practices among respondents in endemic and non-endemic counties were low. Generally, preventive practices against LF were low, even lower in endemic counties compared to non-endemic counties. These findings might strongly support the reasons why Liberia Ministry of Health and National Public Health Institute of Liberia (NPHIL) should intensify awareness on the prevention and control measures on LF as well as introducing LF modules in primary school system.

Conclusion

Level of knowledge about Lassa fever among respondents was poor while, less than half of all respondents had a good attitude toward LF and similarly less than half carried out good practices toward Lassa fever prevention. Living in an endemic area respondents were more likely to have good knowledge whereas, there was no difference in attitudes and practices irrespective of whether a respondent resided in an endemic area or not. Gender and level of education attained were risk factors associated with knowledge and attitudes about LF transmission and Prevention. We recommended that the Ministry of Health and the National Public Health Institute of Liberia increase awareness of LF in Liberia and work with the Ministry of Education to introduce LF lessons in school-health modules, especially in primary and secondary schools in Liberia.

What is known about this topic

- Lassa fever is endemic in six of the fifteen counties in Liberia. It is an immediate notifiable disease under surveillance.
- There have been an increased in cases reported across the country with endemic counties accounting for majority of the cases.
- There has also been awareness ongoing about LF mainly in endemic counties.

What this study adds

- This study provides to the body of knowledge, an understanding of KAP regarding Lassa fever among residents of both endemic and non-endemic areas of Liberia. Such study, is the first of its kind documented in Liberia.

Conflicts of interest

The authors declare no competing interests.

Authors Contribution

Maame Amo-Addae, Peter Adewuyi, Himiede Wilson, Fulton Shannon, lead the designing of the protocol, Training and field data collection as well as the analysis and interpretation while Darius Dolopei assisted with technical review of questionnaire, field data collection, analysis and interpretation as well as manuscript writing. Jimmy Lawubah Ophelia Woods, Oscar Gbearr, Vivian Kemah Deodeh, Austine Sanley, Miatta. Wright Kullie, George Tamatia, Jacob Muyan, Lincoln Gbabow Torwon G. Bunnah, Allakemanie Sackie, Harrison Duo, Darius Lehyeh, Edwin Paye, Phebe Thomas assisted with field data collection as well as analysis and interpretation.

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References

1. Bowen MD, Rollin PE, Ksiazek TG, Hustad HL, Bausch DG, Demby AH, Bajani MD, Peters CJ, Nichol ST. Genetic Diversity among Lassa Virus Strains. J Virol. 2000 Aug; 74(15):6992-7004.https://doi.org/10.1128/JVI.74.15.6992-7004.2000 . PubMed | Google Scholar

2. Knipe DM, Howley P. Fields Virology. Philadelphia: Wolters Kluwer; 2015. Google Scholar

3. Yaro CA, Kogi E, Opara KN, Batiha GE-S, Baty RS, Albrakati A. Infection pattern, case fatality rate and spread of Lassa virus in Nigeria. BMC Infect Dis. 2021; 21:149.https://doi.org/10.1186/s12879-021-05837-x . PubMed | Google Scholar

4. CDC. Lassa Fever. CDC. 2019. Accessed May 2021.

5. Cervantes KB, Lowe L, Semple S, Pierre-Louis F, Cennimo D, Mead KR, Mazur NL, Youssef-Bessler M, Glover M, Manning C, Rokosz G, Lifshitz EI, Sutherland A, Christensen BE, Lucas D, Hamdi HA, Nazir A, Wells JW, Kulkarni PA, Tan CG, Di Domenico LM, Albariño CG, Montoya LA, de Perio MA, Chew D, Rollin PE, Miller LP, Ströher U. Case Report: Imported Case of Lassa Fever – New Jersey, May 201 Am J Trop Med Hyg. 2018 Oct 3;99(4):1062-5. https://doi.org/10.4269/ajtmh.17-0316. PubMed | Google Scholar

6. Adebayo D, Amaechi Nwobi E. Response Preparedness to Viral Hemorrhagic Fever in Nigeria: Risk Perception, Attitude towards Lassa Fever. Epidemiol Open Access. 2015; 5(199).https://doi.org/10.4172/2161-1165.1000199 . Google Scholar

7. Ilesanmi OS, Omotoso B, Alele FO, Adewuyi P. Original Article Awareness of Lassa Fever in a Rural Community in South West Nigeria. JCHR 2015, 4(1): 1-10. Google Scholar

8. Lassa Fever - an overview. ScienceDirect Topics. 2010. Accessed May 2019.

9. Ibekwe T. Lassa fever: The challenges of curtailing a deadly disease. Pan Afr Med J. 2012 Mar; 11(55).https://doi.org/10.11604/pamj.2012.11.55.1303 PubMed | Google Scholar

10. WHO. Lassa Fever - Liberia. WHO. 2018. Accessed May 2021.

11. Fichet-Calvet E, Rogers DJ. Risk Maps of Lassa Fever in West Africa. Tesh R, editor. PLoS Negl Trop Dis. 2009 Mar; 3(3):e388.https://doi.org/10.1371/journal.pntd.0000388 . PubMed | Google Scholar

12. 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 Apr; 14(2):89.https://doi.org/10.4103/1596-3519.149892 . Google Scholar

13. Olugasa BO, Dogba JB. Mapping of Lassa fever cases in post-conflict Liberia, 2008-2012: A descriptive and categorical analysis of age, gender and seasonal pattern. Ann Afr Med. 2015 Apr; 14(2):120-122.https://doi.org/10.4103/1596-3519.149890 . Google Scholar

14. Wikipedia. Liberia. Wikipedia. 2021. Accessed January 2021.

15. Liberia Population 2019 (Demographics, Maps, Graphs). World Population Review. 2019. Accessed May 2019.

16. NPHIL, WHO. Coverage R: Liberia IDSR Epidemiology Bulletin 2019. NPHIL. 2019. Accessed January 2021.

17. Nb E, Rs A, Im S, Pou A. Knowledge, Attitude and Preventive Measures Regarding Lassa Fever among Residents of University of Abuja Staff Quarters Giri, Gwagwalada Abuja. American Journal of Medicine and Medical Sciences .2019; 9(3): 90-95.https://doi.org/10.5923/j.ajmms.20190903.05 . Google Scholar

18. Reuben RC, Gyar SD. Knowledge, attitudes and practices of Lassa fever in and around Lafia, Central Nigeria. 2016;(21):7. Google Scholar

19. 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. Journal of Science and Practice of Pharmacy. 2016; 3(1): 75-83. Google Scholar

20. Ossai EN, Onwe OE, Okeagu NP, Ugwuoru AL, Eze TK, Nwede AS. Knowledge and preventive practices against Lassa fever among heads of households in Abakaliki metropolis, Southeast Nigeria: A cross-sectional study. Proceedings of Singapore Healthcare. 2020; 29(2):73-80.https://doi.org/10.1177/2010105819899120 . Google Scholar

21. Akinwumi AA, Ademola AO, Oladimeji AE, Abiodun OC, Oghenevo AG, Adebola AO. Knowledge of Lassa Fever among Students of a College of Education: Call for Inclusion in Curriculum. Journal of Advances in Medicine and Medical Research. 2016;16(9):1-8.https://doi.org/10.9734/BJMMR/2016/26857 . Google Scholar

22. Faith I, Harrison E, O AA, Ekundare FO, A RE, O OC. Knowledge, Attitude and Infection Prevention and Control Practices Regarding Lassa Fever among Healthcare Workers in Edo State, Nigeria. International Journal of Prevention and Treatment. 2019; 8(1):21-27.https://doi.org/10.5923/j.ijpt.20190801.03 . Google Scholar

23. Olalekan AW. Community awareness and perception towards rodent control: Implications for prevention and control of Lassa fever in urban slums of Southwestern Nigeria. Malta J Health Sci. 2015, 2(1):26-32. Google Scholar

Table 1: Criteria for determining good or poor knowledge, positive or negative attitude and good or poor practice endemic vs non-endemic areas, Liberia, 2018		
Questions consider for Good Knowledge	**Criteria= Yes**	**Poor knowledge**
Ever heard about Lassa fever?	Yes	Any response other than what meets the criteria for good knowledge implies a gap in knowledge.
Rodents (rats) can transmit Lassa fever	Yes	
Food and drink contaminated by excreta	Yes	
fever (>38°C) that is unresponsive to anti-malarial and antibiotics	Yes	
Bleeding from orifices	Yes	
Proper storage of Food/drinks is protective	Yes	
Can be cured of Lassa fever	Yes	
Questions consider for Positive Attitudes	**Criteria for Positive Attitudes**	**Negative Attitudes**
Can anyone get Lassa fever?	Yes	Any response other than what meets the criteria for good attitudes was consider as poor attitudes
Do you believe that you at risk of LF?	Yes	
If someone is sick, where to seek treatment	Health facility	
Do you provide care for LF patient(s)?	Yes	
Type of care actions taken by respondents	Take person to the health facility	
Questions consider for Good Practices	**Criteria for Good practices**	**Poor Practices**
Action taken against rodents	Yes	Any response other than what meets the criteria for good practices was consider as poor practices.
Use of sealed containers to store food	Yes	
Waste food after rodent(s) have contact	Yes	
Seeking care at health facility if suspected of LF	Yes	
Do you eat rodent	No	

Table 2: Socio-Demographic Characteristics of Respondents, Endemic vs Non-endemic Counties, Liberia, 2018			
Respondents	**Overall N=858**	**Endemic stratum n=416 (48%)**	**Non-endemic stratum n= 442 (52%)**
Sex (n=858)			
Male	417 (49)	210 (51)	207 (47)
Female	441 (51)	206 (49)	235 (53)
Age (n=844)			
Mean (years)	40	41	39
Standard deviation	14	14	14
Marital status (n=858)			
Married	419 (49)	236 (57)	183 (41)
Co-habiting	206 (24)	99 (24)	107 (24)
Single	196 (23)	68 (16)	128 (29)
Others*	37 (4)		
Occupation (n=858)			
Farmer	308 (35)	221 (53)	87 (20)
Shop keeper	154 (18)	47 (11)	107 (24)
Student	40 (5)	7 (2)	33 (7)
Health worker	39 (5)	22 (5)	17 (4)
Social worker	25 (3)	11 (3)	14 (3)
None	147 (17)	79 (19)	68 (15)
Others**	18 (2)	29 (8)	116 (27)
Level of education (n=858)			
Higher (college/university)	93 (11)	23 (6)	70 (16)
Secondary	361 (42)	170 (41)	191 (43)
Vocational	24 (3)	5 (1)	19 (4)
Primary	144 (17)	82 (20)	62 (14)
None	229 (27)	130 (31)	99 (22)
Unknown	7 (1)	6 (1)	1
Monthly income (USD) (n=847)			
0 – 249	464 (95)	211 (46)	253 (55)
250 – 499	14 (3)	4 (29)	10 (71)
500 – 749	7 (1)	3 (43)	4 (57)
750 – 999	2 (1)	1 (50)	1 (50)

Table 3: Knowledge, Attitude and Practice of Lassa fever among adults, Liberia, 2018					
Variables	**Overall n= 858**	**Endemic stratum (n=416)**	**Non-endemic stratum (n=442)**	**Prevalence Odds Ratio (CI)**	**Chi-square (P-value)**
Knowledge					
Good	24 (3)	17 (4)	7 (2)	2.6 (1.1- 6.2)	4.9 (0.02)
Poor	834 (97)	399 (96)	435 (98)		
Attitude					
Positive	250 (29)	125 (30)	125 (28)	1.1 (0.8 – 1.4)	0.3 (0.6)
Negative	608 (71)	291 (70)	317 (72)		
Practice					
Good	217 (25)	95 (23)	122 (28)	0.8 (0.6 -1.0)	2.5 (0.1)
Poor	641 (75)	321 (77)	320 (72)		

Table 4: Factors associated with good knowledge and positive attitudes related to Lassa fever among adults, Liberia, 2018				
Factor Overall	**N= 858**	**Measure of association (prevalence odds ratio)**	**95% confidence interval**	**P-value**
Location				
Endemic	17	2.6	1.1 – 6.2	**0.02**
Non-endemic	7			
Gender				
Male	9	0.6	0.2 -1.4	0.2
Female	15			
Level of education				
Higher education	93	0.3	0.1 – 0.5	**0.0001**
Lower	765			
Factors associated with positive attitudes related to Lassa fever among adults, Liberia, 2018				
Factor	**Overall N=858**	**Measure of association (prevalence odds ratio)**	**95% confidence interval**	**P-value**
Location				
Endemic	125	0.9	0.6 - 1.2	0.5
Non-endemic	125			
Level of education				
Higher education	27	0.9	0.6 – 1.5	0.9
Lower	223			
Level of knowledge				
Good	17	2.6	1.1 – 6.4	**0.02**
Poor	7			

Table 5: Association between Knowledge, Attitude and Practice of Lassa Fever and selected risk factors, Liberia, 2018												
Variables	**Gender n=858**		**Prevalence Ratio (CI)**	**Chi-square (P-value)**	**Level of Education n=858**		**Prevalence Ratio (CI)**	**Chi-square (P-value)**	**Age category n=824**		**Prevalence Odds Ratio (CI)**	**Chi-square (P-value)**
	Female	**Male**			**Higher**	**Lower**			**Younger**	**Older**		
Knowledge												
Good	7	17	**0.3 (0.1-0.9)**	**4.8 (0.02)**	37	211	**1.7 (1.1-2.7)**	**6.0 (0.01)**	16	8	0.6 (0.3-1.6)	0.9 (0.35)
Poor	434	400			56	554			600	200		
Attitude												
Positive	118	130	0.8 (0.6-1.0)	2.0 (0.15)	37	211	**1.7 (1.1-2.7)**	**6.0 (0.01)**	183	56	1.1 (0.8-1.6)	0.5 (0.44)
Negative	323	287			56	554			433	152		
Practice												
Good	111	106	0.9 (0.7-1.3)	0.0 (0.93)	26	191	1.2 (0.7-1.8)	0.4 (0.53)	152	52	0.9 (0.6-1.4)	0.0 (0.92)
Poor	330	311			67	574			464	156		

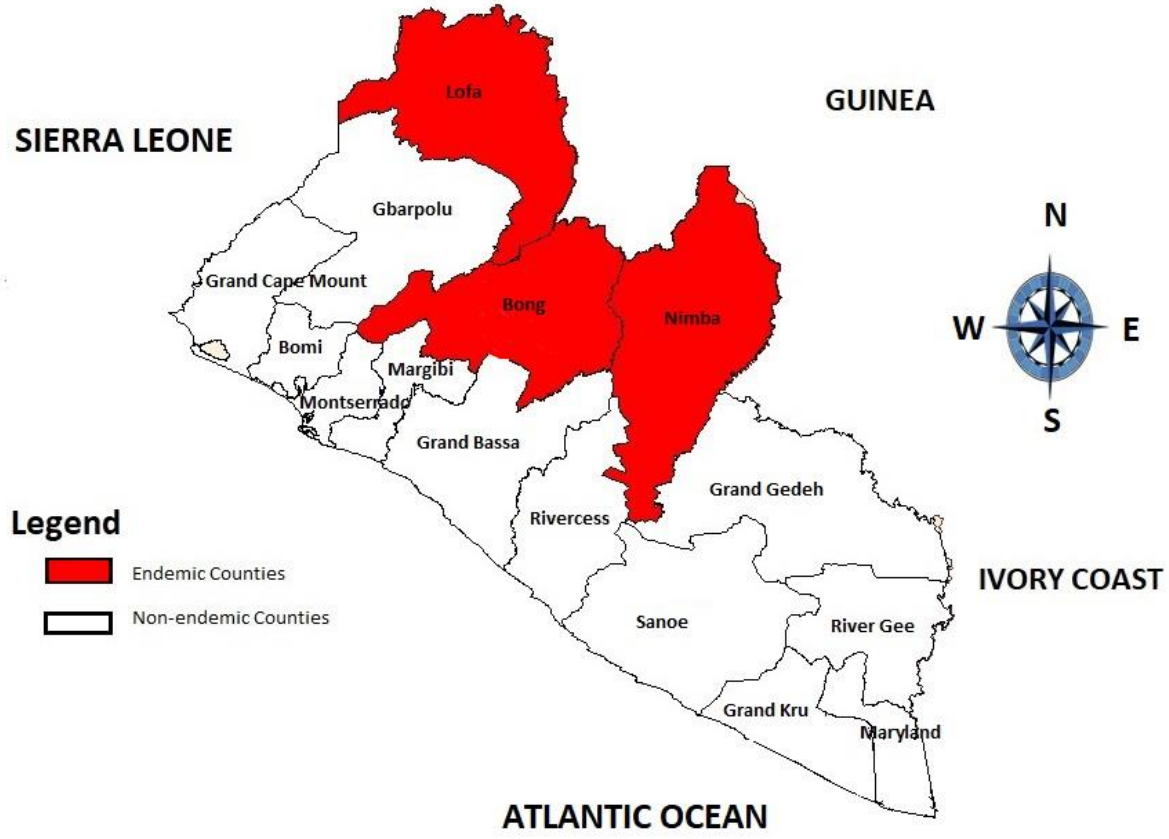

Figure 1: A map showing endemic and non-endemic counties of LF in Liberia, 2018