

Exploring the Factors Affecting the Uptake of Standard Practices for Lassa Fever Prevention in Nigeria: A Case Study of Endemic States in West Africa

Inigbehe Babatunde Oyinloye^{1*} and Paul Olaiya Abiodun²

¹World Health Organization, United Nations House Plot 617/618
Central Area District PMB 2861 Abuja, Nigeria

²Adjunct Prof Texila American University, US

Abstract

The cases of Lassa fever (LF) infection are rising and call for a change in attitude and practice towards the prevention of the disease. This work was aimed at assessing the factors affecting the uptake of standard practices for LF prevention in Nigeria. This had two phases: observation and desk review of other related data from study communities. Situation reports (SiTrep) reports were reviewed in these communities' health facilities from the Federal Ministry of Health (FMOH) and the Centre for Disease Control and Prevention (CDC) from 2012 to 2022 and analyzed. Samples from 300 respondents were assessed, with a male: female ratio of about 1.3:1 and a mean age of 35.01 ± 10.721 years. Our findings showed that there is high sensitization for LF and there is also high media involvement. However, there is often a late presentation of LF cases to healthcare facilities. The HCWs do not give optimum awareness creation to the host communities (52.0%). Our findings showed that PPE use was seen as key in preventing LF among the HCWs; however, the availability of PPE is still not enough. Attitudinal change and adoption of practices that will promote the prevention of LF is therefore advocated. Such practices include the provision and effective use of PPE, early presentation of LF cases, improved LF surveillance, and continuous training of HCWs. These practices will improve the uptake of the control strategies for LF.

Keywords: Attitude, Endemic, Lassa fever, PPE, Standard-practices.

Introduction

Lassa fever (LF) is a disease caused by the Lassa fever virus (LASV), a single-stranded RNA virus. It is usually transmitted by a species of rodents called *Mastomys natalensis*, although there have been interspecies transmission of the LASV. Even though the virus was first described in the 1950s, it was not identified until 1969 when two missionary nurses were killed by the disease and was subsequently named after a town in the present Borno state of Nigeria, where the first case of the disease was recorded [1]. It is associated with high morbidity and mortality and has

economic and health security consequences. It is endemic in West Africa, including Nigeria, which poses a significant public health challenge. LF is endemic in Nigeria and some other West African countries where the carrier of the LASV abounds [2, 3]. These infected rats deposit the virus when they pass their excreta on household foods and other items that are not properly covered. The viruses find their way into humans on consumption of such foods [3, 4].

Apart from Nigeria, other West African countries affected are Liberia, Ghana, Guinea, Mali, Benin, Togo, and Sierra Leone; however,

Nigeria has the highest prevalence of the disease. In May 2023, Lassa fever cases were reported in 101 local government areas across 26 states and the Federal Capital Territory in Nigeria [2]. The cases of Lassa fever keep rising and call for increased attention and implementation of strategies that will mitigate the impact of the disease [5]. Prevention is the best approach in the control of LF where the communities and the HCWs need to work collaboratively to ensure the desired outcome. Therefore, efforts should be geared towards the prevention of the disease. The manner in which the standard practices are executed is important in the overall outcome of the preventive practices. This was is therefore aimed at exploring the factors that affect the uptake of standard practises for Lassa fever Prevention in Nigeria using the socio-economic model.

Materials and Methods

Study Design

This research was a cross-sectional study designed to evaluate the awareness and the adoption of Lassa Fever prevention practices in select endemic states of Nigeria. The study had two phases: observation and desk review of other related data from the endemic states for Lassa fever in Nigeria. Situation reports (SiTrep) reports were reviewed in these communities' health facilities from the Federal Ministry of Health (FMOH) and the Centre for Disease Control and Prevention (CDC) from 2012 to 2022 and analysed. The second phase of the study was a cross-sectional descriptive study that involved a researcher-administered questionnaire to assess the awareness and adoption of Lassa Fever prevention practices in select endemic states of Nigeria.

The study population was made of participants from select endemic states in Nigeria studied were: Edo state, Ondo, Bauchi, Benue, Borno, and Taraba states (Figure 1).

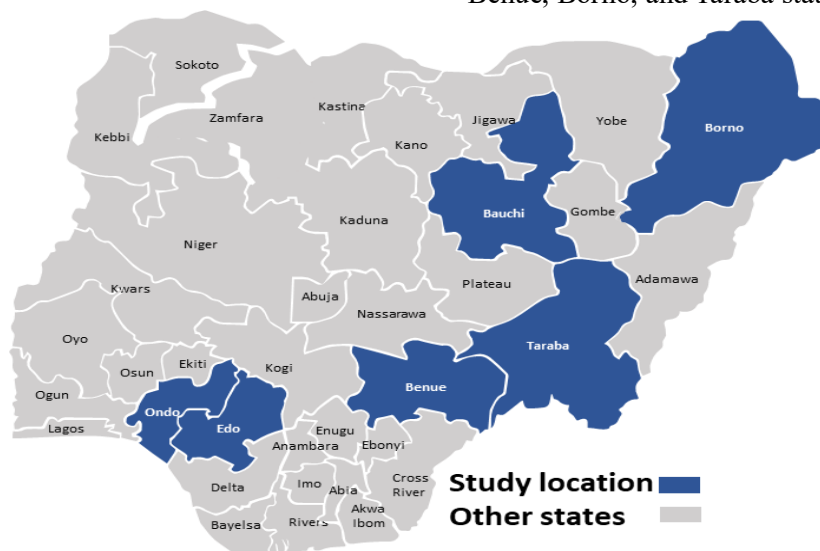


Figure 1. Map Showing Study Location in Nigeria adapted from Map chart

Since the data for the study was collected in two parts (data extraction and interview), only the data of populations in endemic states and health workers in healthcare facilities from January 2012 to December 2022 were extracted. Similarly, all key populations aged 18 years and above in households in the

endemic states were included in the interviews. Both genders were included to ensure gender equity. However, participants <18 years, sick participants and health workers less than 2 weeks old in their employment in the health facilities were excluded.

Sampling Technique

Secondary data from all the endemic states were used. Using SPSS. The data obtained were transcribed and thematically analyzed. The sampling was done on the assumption that the prevalence of Lassa fever is 15% [6] and at 95% confidence interval of + 0.05 and -0.05, the sample size was determined as follows:

$$\text{Sample size } (n) = z^2 \times P \times (1 - P) / e^2$$

Where;

z = z-score

e = margin of error

P = population proportion

The margin is error was 0.05, the z-score at 95% confidence was 1.96 and the population proportion was 0.15.

$$\text{Sample size } (n) = 1.96^2 \times 0.15 \times (1 - 0.15) / 0.05^2$$

$$\text{Sample size } (n) = 3.8416 \times 0.15 \times (1 - 0.15) / 0.05^2$$

$$\text{Sample size } (n) = 0.57624 \times 0.85 / 0.05^2$$

$$\text{Sample size } (n) = 0.48980 / 0.05^2$$

$$\text{Sample size } (n) = 195.9$$

From the calculation, n was rounded up to 196

To make provision for drop out, extra 20% of the sample was added (39). Therefore, the final sample size, n was 235. The questionnaire was rounded up to 300 to make provision for the pilot survey.

Data Collection and Analysis

Data were collected online via the use of Google Forms. Information collected included socio-demographic information, gender, educational level, type of meat consumed, level

of awareness of Lassa fever, awareness of risk factors and preventive practices including sanitation practices. A Microsoft Excel data abstraction template was used for data extraction from the secondary data from health workers, households, and FMOH. Two trained abstractors conducted the data extraction and reviews. The completeness, clarity, and consistency of data were properly checked. Two trained research assistants administered a structured questionnaire to clients/participants to collect socio-support data.

The extracted data were exported into IBM-SPSS version 25.0 for analysis. Descriptive statistics were performed, presenting outcomes as frequency tables, percentages, bar charts. Pearson's chi-square test was also used to compare variable proportions. Univariate and multivariate logistics regression tests were performed to determine the factors for hesitancy, setting p -values below 0.05 as significant.

Results

Socio-demographics Characteristics

Throughout the study, 300 samples were recorded from different states and gathered, and cross-checked before furthered for the analyses. Socio-demographic characteristics of the study participants were collected with 86 (28.7%) respondents from Borno State which was the highest recorded in the study, followed by 63 (21.0%) from Edo, Bauchi 42 (14.0%), 40 (13.3%) from Ondo State, 35 (11.7%) from Benue State and 34 (11.3%) from Taraba State respectively (Table 1).

Table 1. Socio-demographic Characteristics of the Respondents

Variables	Frequency	Percent
State of Residence		
Bauchi	42	14.0
Benue	35	11.7
Borno	86	28.7
Edo	63	21.0
Ondo	40	13.3
Taraba	34	11.3

Gender		
Male	167	55.7
Female	133	44.3
Age of Respondents		
11 - 20 years	4	1.3
21 - 40 years	226	75.3
41 - 60 years	69	23.0
61 - 70 years	1	0.3
Educational Level		
Secondary Level	13	4.3
Diploma Level	44	14.3
Graduate (First Degree)	151	48.3
Post-Graduate (Masters)	84	23.7
Post-Graduate (PhD)	8	2.7
Geographic State		
Urban	199	66.0
Rural	101	34.0
Total	300	100.0

For the gender distribution, 167 (55.7%) of the respondents were males which was slightly higher than the females which were 133 (44.3%). The mean and SD for the age of the respondents recorded were 35.01 ± 10.721 with a greater percentage of the respondents within the age range of 21-40 years (226, 75.3%), then 69 (23.0%) at the age range of 41-60 years, followed by 11-20 years with 4 (1.3%) with a smaller percentage of the study population 1(0.3%) were within the age range of 61-70 (Table 1). The level of education shows that the respondents were predominantly graduates (151, 48.3%) (First Degree), 84 (23.7%) had

Post Graduate (Masters) education, then 44 (14.3%) had Diploma education, 13 (4.3%) have Secondary education and 8 (2.7%) of the respondents had Postgraduate (PhD) education respectively. For the geographic strata, 199 (66.0%) of the respondents were from Urban while 101 (34.0%) were from Rural settlement (Table 1).

The socio-economic stratification of the respondents revealed that 33 (11.0%) of them were from the low economic class, 244 (81.3%) were from the middle class, representing the highest class in the study while 23 (7.7%) were from the upper class (Figure 2).

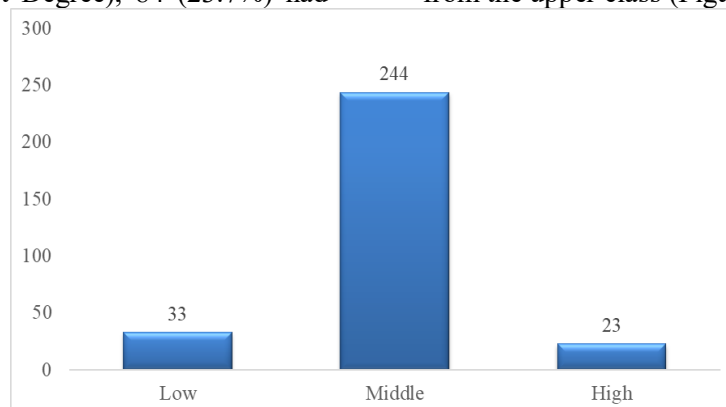


Figure 2. Socio-economic Class

Attitudes Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

The results showing the attitudes of the respondents towards the uptake of standard practice to prevent Lassa fever infection are presented in Table 2. The result showed that the majority of the respondents 286 (95.33%) were involved in the community sensitization sessions with only 8 (2.7%) not involved while 6 (2.0%) were not sure about their involvement in community sensitization sessions.

For the late presentation of Lassa fever infection at health facilities, 281 (93.7%) of the respondents strongly agreed that there is late presentation of Lassa fever infections at health facilities due to the knowledge and attitudes of those with Lassa fever infections. The result further revealed the role of media in reducing the spread of Lassa fever infection where 273 (91.0%) strongly agreed, 18 (6.0%) were neutral and 7 (2.3%) disagreed with the fact that media can play a role in helping to reduce the spread of Lassa Fever infections in the community.

Table 2. Attitude on Factors Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

Variables	Frequency	Percent
Do you agree there is poor involvement in community sensitization sessions as regards Lassa Fever in your community and Health facility?		
Yes	286	95.3
No	8	2.7
I am not sure	6	2.0
Do you agree that persons who have been infected with Lassa Fever infection present late at the health facilities?		
Strongly Agree	281	93.7
Neutral	12	4.0
Disagree	4	1.3
I don't know	3	1.0
Do you listen to the Media? If yes, do you agree the media can play a role in helping to reduce the spread of LF?		
Strongly Agree	273	91.0
Neutral	18	6.0
Disagree	7	2.3
I am not sure	2	0.7

Practices Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

Table 3 shows the respondents' practice towards influencing the uptake of standard practices to prevent Lassa fever infection. Approximately half of the respondents 156 (52.0%) reported that their health facilities engaged in the community sensitization or awareness creation for Lassa Fever infections; however, 58 (19.3%) said that the health

facilities do not engage in any community sensitization, 59 (19.7%) of the respondents were unsure if the health facilities engaged in sensitization or not while 27 (9.0%) don't know about the engagement of the health facilities towards sensitization or awareness on Lassa fever prevention.

A greater percentage of the respondents (86.7%) strongly agreed that the use of Personal Protective Equipment (PPE) in hospitals helped reduce transmission of Lassa fever, 9.3% were

neutral, 2.3% disagreed while 1.7% didn't know if the use of PPE in hospitals helped reduce transmission of Lassa fever.

For the availability of Personal Protective Equipment (PPE) in the health facilities the study further revealed that 146 (48.7%) of the respondents reported that PPEs were available at the health facilities, 67 (22.3%) responded that there are not available, 20 (6.7%) preferred not to respond about the availability of the PPEs

at the health facilities while 67 (22.3%) don't know whether there are PPEs at the health facilities or not. The study further inquired about the importance of active surveillance and contact tracing from the respondents where 261 (87.0%) strongly agreed that it is important to have active surveillance and contact tracing, 16 (5.3%) were neutral, 6 (2.0%) disagreed while 17 (5.7%) don't know if active surveillance and contact tracing vital in Lassa Fever response.

Table 3. Practice on Factors Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

Variables	Frequency	Percent
Does your Health Facility engage or create any Community Sensitization or Awareness on Lassa fever Prevention?		
Yes	156	52.0
No	58	19.3
I am not sure	59	19.7
I don't know	27	9.0
Does the use of Personal Protective equipment in hospitals helpful in reducing transmission of LF?		
Strongly Agree	260	86.7
Neutral	28	9.3
Disagree	7	2.3
I don't know	5	1.7
Is your health facility equipped with Personal Protective Equipment (PPE)?		
Yes	146	48.7
No	67	22.3
Prefer not to answer	20	6.7
I don't know	67	22.3
Regarding the management of LF in hospitals, Is Active surveillance and contact tracing vital in Lassa fever response?		
Strongly Agree	261	87.0
Neutral	16	5.3
Disagree	6	2.0
I don't know	17	5.7

Risk Factors for Lassa Fever and Linear Regression Analysis for Factors associated with Lassa Fever Infection in Nigeria

Several factors were considered as risks for Lassa fever- poor hygiene, eating bush meat, overcrowding, food storage processing, and bush burning as presented in Figure 3.

Considering poor hygiene as a risk factor for Lassa Fever, 282 (94.3%) of the respondents claimed to have considered poor hygiene as a risk for Lassa fever infection while 18 (5.7%) responded that to had not considered poor hygiene as a risk factor for the infection of Lassa Fever. Moreover, eating bush meat as risk factor for Lassa Fever, 255 (85.0%) reported

that eating bush meat is a risk factor while 45 (15.0%) did not see eating bush meat as a risk factor for Lassa fever infection. The study further revealed that 196 (65.3%) of the respondents considered overcrowding as a risk factor for Lassa fever while 104 (34.7%) reported that overcrowding is not a risk factor

for Lassa fever. Considering poor food storage processing as a risk factor for Lassa fever, 283 (94.3%) considered poor food storage processing as a risk factor for Lassa fever. Only 190 (63.3%) considered bush burning as a risk factor for Lassa fever.

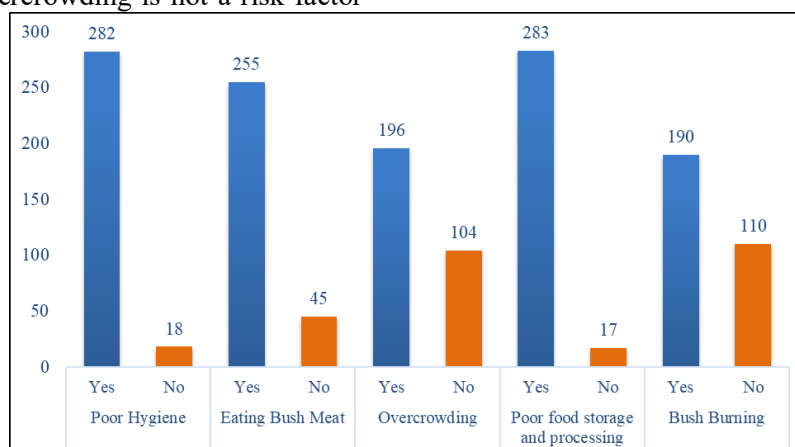


Figure 3. Risk Factors for Lassa Fever Infections

Table 4 further assessed the risk factors associated with Lassa fever infection using the Linear regression model carried out to check the association between the dependent variables which are the age of the respondents and some risk factors. The R-squared value was given as 0.021. This indicated that the age is predictable from the independent variable. There was a negative coefficient of -2.365 between the age and knowledge of preventive practices for Lassa fever infection as provided by the Federal Ministry of Health (FMOH) or Nigeria Centre for Disease Control (NCDC) which implies that the decrease in age of the respondent increased the knowledge of the respondent. A negative coefficient of -0.277 and -1.609 were also

recorded in the relationship between age and the predictor variable (reducing the consumption of bush meat and bush burning will likely contribute to a decrease in Lassa fever infections in the community) and (training on management of Lassa fever infection by the respondents) respectively. The *p*-value of the association was greater than 0.05 (0.067, 0.848, 0.753, 0.145) for each of the independent variables as shown in Table 4 below respectively. Figure 4 below also shows the normal probability-probability (PP) plot where the residuals were normally distributed across the line which supports the assumption with a little residual as outliers.

Table 4. Linear Regression Analysis for Factors Associated with Lassa Fever Infection in Nigeria

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std. Error	Beta			Lower Bound	Upper Bound
(Constant)	40.215	2.689		14.954	0.000	34.923	45.508
Do you know the FMOH or NCDC preventive practices for LF?	-2.365	1.285	-0.109	-1.840	0.067	-4.894	0.164

Do you agree that processing or storing your food in an open container or increases the risk of contamination with LF?	0.343	1.792	11	0.191	0.848	-3.184	3.870
Do you think reduction in consumption of bush meat and bush burning will reduce Lassa fever infection in your community?	-0.277	0.882	-0.019	-0.314	0.753	-2.013	1.459
Have you been trained on management of LF including its Infection and preventive measure?	-1.609	1.100	-0.086	-1.463	0.145	-3.774	0.555

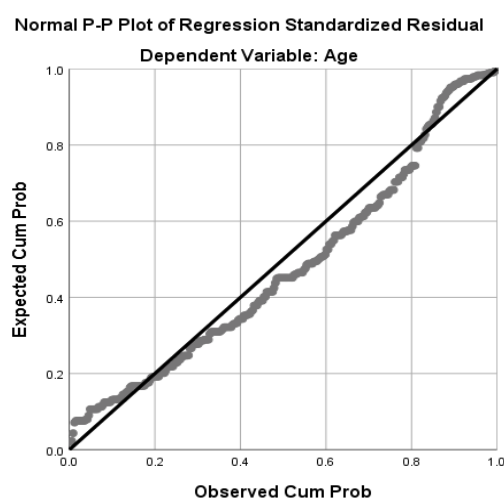


Figure 4. Normal P-P plot of Regression

Discussion

Socio-demographics Characteristics

The socio-demographic data of the respondents are as presented in Table 1. The study was performed in states with notable LF outbreaks- Edo, Ondo, Bauchi, Benue, Borno, and Taraba states. These states were representative of the states with a high prevalence of Lassa fever across the different senatorial districts in Nigeria. In 2023, a high proportion of confirmed cases (72%) were concentrated in three states: Ondo (32%), Edo (29%), and Bauchi (11%) [2] and these states were included in the study [2]. Benue and Taraba are bordering Cameroon where Lassa fever has also been reported while Borno is the state where the disease was first detected in

Nigeria. From the gender distribution of the respondents, the marginal difference between the two genders (male and female) would ensure a balance of information gathering from the response and remove any form of gender bias, validating the outcome of the research (Table 1). Lobato et al opine that there is a strong difference between male and female participants regarding social influences on the decision to participate in clinical research [7]. More so, according to Thelwall et al., women and men have different preferences for methods of data collection, where women often opt for qualitative methods while men prefer quantitative methods [8]. This underscores the need for parity in the choice of participants in public health research. A systematic review in 2021 showed that the age group mainly affected

by Lassa fever is 21 to 40 years, occurring more in males in comparison to females (1:0.8) [9]. However, a recent situation report from NCDC shows that the predominant age group affected is 21-30 years (Range: 1 to 98 years) [10]. The age group of the respondents in this study 21-40 years (75.3% of respondents) is in tandem with the age group mostly affected by Lassa fever according to previous reports. Even though most of the responses came from the age group 21-40, the responses from other age brackets should not be discounted. Johns Hopkins Medicine suggests that clinical research should include people of different ages and genders to increase the credibility of research outcomes in terms of efficacy and safety to the populace [11].

Concerning the educational level of the participants, it showed that the majority of the participants were educated. Authors have divergent views on the impact of the level of education of the participants in predicting the overall outcome of a research. Scanlon et al. argue that educational level is not strongly predictive of research participation; however, for many other researchers, more educated and richer people are more likely to participate in research surveys [12, 13]. In this study, the majority of the respondents (66%) live in urban centres. Although some authors argue that Lassa fever is a rural disease due to the favourable conditions therein [14, 15], the trends are changing now. Recent studies reveal that there is a shift in the occurrence of Lassa fever from rural to urban settings. This highlights the need for increased surveillance of the disease in urban areas, and prioritise control in urban centres too [16]. Moreover, there is an increase in rural-urban migration, causing a dramatic increase in the population in the urban centres. Increased population densities in urban centres may enhance human-to-human transmission and impact the distribution of rodent reservoirs.

Attitudes Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

The attitude of the respondents towards the uptake of standard practices is presented in Table 2. Wogu reported that even when there is sensitization from different quarters including the mass media, the rural community reach is still very poor [17]. In recent times, HCWs have even taken the sensitization about Lassa fever to the marketplaces [18]. This is in tandem with our findings which showed that there is increased sensitization about Lassa fever from the HCWs (95.33%). Fatiregun et al. argue that most sensitization programs may not leave meaningful impacts as they are merely planned to pass instructions rather than engage the participants [19]. They therefore suggested the adoption of adult learning theory in the sensitization where the community will be involved in the planning and evaluation to make the sensitization problem-centred rather than content-centred [19, 20]. A community-centred sensitization will help in the uptake of standard practices to prevent Lassa fever.

Our findings showed that there was a late presentation of Lassa fever by patients (Table 2). In line with our findings, Chandra et al. also reported that most Lassa fever patients present late to the clinic, after 6 days of onset and called for more accurate and complete surveillance data to decipher the actual causes of the delays in presentation [21]. Ipadeola et al. opine that living in rural areas and months of suspicion of the disease are among the factors contributing to the late presentation of the disease in hospitals [22]. Some rural areas do not have easily accessible healthcare facilities. Ipadeola et al. therefore argued that tackling late presentation can significantly improve Lassa fever management by increasing the uptake of the IPC [22].

Our findings further revealed that the media play critical role in reducing the impact of Lassa fever infection (Table 2). Several authors argue that the media, especially social media, is very

important in spreading the message concerning the prevalence and control of Lassa fever in Nigeria via awareness creation and Lassa fever health education [23, 24]; however, some scholars argue that the use of social media is an exclusive reserve of the educated [17].

It is therefore pertinent to apply positive attitudes to effectively drive the uptake of the tools for Lassa fever via attitudinal change in the use of these tools.

Practices Influencing the uptake of Standard Practices to Prevent Lassa Fever Infection

The practices influencing the uptake of standard practices to prevent Lassa fever infection are presented in Table 3. The result showed that the effort/practice of the health facilities towards preventing Lassa fever in terms of awareness creation is at a 52.0% level (Table 3). As earlier shown in previous study, the awareness of Lassa fever is high among the respondents (95.0%); however, awareness creation by the health facilities to the host community is low (52.0%). The non-correlation of the HCWs and sensitization to the host community is likely to affect the uptake of standard practices to prevent Lassa fever. The promotion of community hygiene via awareness creation is one of the approaches for the prevention of Lassa as this discourages rodents from entering homes [25].

Our findings showed that PPE use was seen as key in preventing Lassa fever among the HCWs. The SiRep since 2017 shows an increase in the prevalence of Lassa fever in terms of the number of suspected and confirmed cases respectively; however, the mortality rate has declined and has remained fairly stable since 2022 (NCDC). This may be due to increased awareness and increased use of PPE by the HCWs. The importance of PPE, such as gloves, gowns, masks, and goggles, cannot be underestimated as it reduces the risk of human-to-human transmission of Lassa fever [26].

The majority of the respondents did not agree with the availability of PPE (over 50%) as shown in Table 3. The unavailability of PPE in healthcare facilities can promote the spread of the disease among HCWs and ultimately increase the prevalence of Lassa fever [27]. PPE is necessary when caring for Lassa fever patients to prevent nosocomial transmission of Lassa fever [28]. Even when PPE is available, their accessibilities may vary, where gloves and facemasks are often the most available [29]. According to Kim et al., increased access to PPE is associated with shorter and less severe illness, as it reduces or limits the doses of the virus reaching human subjects [30].

The 87.0% of the respondents who agreed to the need for active surveillance of Lassa fever underscores the importance of the process in reducing the burden of the disease. The surveillance is shifting from search for Lassa fever patients to rodents with the LASV. The ability to detect the LASV in rodents at the point of collection can increase the surveillance of the Lassa fever disease and obviously increase the control [31].

Risk Factors for Lassa Fever and Linear Regression Analysis for Factors Associated with Lassa Fever Infection in Nigeria

Our findings showed that poor hygiene, eating bush meat, overcrowding, food storage processing, and bush burning are important risk factors for Lassa fever. For this reason, Alope et al, proposed the reduction in the consumption of bush meat and bush burning as some of the approaches for containing the disease [32]. The WHO says that unsafe water or unsafe food storage where rats have easy access increases the risk of contracting Lassa fever [33]. promotion of good hygiene to reduce rodent access to homes is said to be important in preventing the disease [34].

The negative correlation between age and the knowledge of preventive practices for Lassa fever infection is quite informative (Table 4).

Naga et al. in their study revealed that health consciousness and behaviour are affected by the age of an individual [35]. This could mean that the younger generation are more in tune with the knowledge of Lassa fever than the older people, which could be due media education [36]. Alope et al, proposed the reduction in the consumption of bush meat and bush burning as some of the approaches for containing the disease [32]. More so, training and retraining in the management of Lassa fever will increase the awareness and knowledge of Lassa fever. This will ultimately lead to the acceptance of the control approaches and an eventual drop in the prevalence of the disease. Teachings or trainings that promote good “community hygiene” will discourage rodents from entering homes and also improve the use of PPE to reduce human-to-human transmission [33].

Conclusion

There is high sensitization in communities for Lassa fever. A community-centred sensitization will help in the uptake of standard practices to prevent Lassa fever. High sensitization, perhaps with low impact, late presentation of cases to healthcare facilities and increased media usage are attitudes that can influence the uptake of standard practices to prevent Lassa fever. It is therefore pertinent to apply positive attitudes to effectively drive the uptake of the tools for Lassa fever via attitudinal change in the use of these tools. The sensitization which could be done via the media should be people-centred. The practice of low awareness creation by HCWs to host communities and poor provision of PPE should be discouraged. However, a report of high use of available PPE by HCWs and increased surveillance are good practice that should be upheld to enhance the uptake of standard practices for the prevention of Lassa fever. Poor hygiene, eating bush meat, overcrowding, food storage processing, and bush burning are important risk factors for Lassa fever are

practices that should be discouraged to improve the outcome in Lassa fever control.

Study Limitations

The study only covered six states in Nigeria out of the 36 states. Even though these states have records of Lassa fever infection, there may be unique of some states that may have been captured in the six states studied. More so, no state was selected from South West, South East, and North West Nigeria. Nigeria has six geopolitical zones with their respective diversities. Inclusion of at least a state from each zone would have made the data more robust.

Ethical Consideration

Ethical approval to conduct this study was sought from the Federal Ministry of Health Research Ethics Committee (MOHREC) (NHREC Approval Number NHREC/01/01/2007-19/01/2024, See Appendix). Approval/grant letter was given to health facilities and the Lassa fever centre. Similarly, permission was secured from the healthcare facilities where the participants who are health workers were recruited. Informed consent was obtained from all participants. Participants were recruited voluntarily and those who wanted to leave the study were allowed without any objection. The study was conducted in line with guidelines of public health research- autonomy, beneficence, non-maleficence and justice.

Conflict of Interest

The authors declare no conflict of interest.

Acknowledgements

The authors wish to acknowledge the community leaders and hospital managements for allowing the study to be conducted in their communities and hospital facilities respectively.

References

- [1]. Richmond, J. K., & Baglole, D. J., 2003, Lassa fever: epidemiology, clinical features, and social consequences. *BMJ: British Medical Journal*, 327(7426), 1271.
<https://doi.org/10.1136/BMJ.327.7426.1271>
- [2]. WHO., 2023, May 1). *Disease Outbreak News: Lassa Fever – Nigeria*.
<https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON463>
- [3]. Duvignaud, A., Jaspard, M., Etafo, I. C., Gabillard, D., Serra, B., Abejegah, C., le Gal, C., Abidoye, A. T., Douthi, M., Owhin, S., Séri, B., Vihundira, J. K., Bérerd-Camara, M., Schaeffer, J., Danet, N., Augier, A., Ogbaini-Emovon, E., Salam, A. P., Ahmed, L. A., de Bruyne Mushenvula, J. P., 2021, Lassa fever outcomes and prognostic factors in Nigeria (LASCOPE): a prospective cohort study. *The Lancet. Global Health*, 9(4), e469–e478.
[https://doi.org/10.1016/S2214-109X\(20\)30518-0](https://doi.org/10.1016/S2214-109X(20)30518-0)
- [4]. Ogbale, M. E., Ameh, J. A., Mailafia, S., Olabode, O. H., & Adah, B. J., 2022, Occurrence of Lassa Fever Virus Infections and Control Efforts in Nigeria. *Hosts and Viruses*, 9(1).
<https://doi.org/10.17582/JOURNAL.HV/2022/9.1.7.11>
- [5]. Naeem, A., Zahid, S., Hafeez, M. H., Bibi, A., Tabassum, S., & Akilimali, A., 2023, Re-emergence of Lassa fever in Nigeria: A new challenge for public health authorities. *Health Science Reports*, 6(10).
<https://doi.org/10.1002/HSR2.1628>
- [6]. WHO, 2024, *Lassa fever*.
https://www.who.int/health-topics/lassa-fever#tab=tab_1
- [7]. Lobato, L., Bethony, J. M., Pereira, F. B., Grahek, S. L., Diemert, D., & Gazzinelli, M. F., 2014, Impact of gender on the decision to participate in a clinical trial: A cross-sectional study. *BMC Public Health*, 14(1), 1–9.
<https://doi.org/10.1186/1471-2458-14-1156/TABLES/3>
- [8]. Thelwall, M., Bailey, C., Tobin, C., & Bradshaw, N. A., 2019, Gender differences in research areas, methods and topics: Can people and thing orientations explain the results? *Journal of Informetrics*, 13(1), 149–169.
<https://doi.org/10.1016/J.JOI.2018.12.002>
- [9]. Grace, J. U. A., Egoh, I. J., & Udensi, N., 2021, Epidemiological trends of Lassa fever in Nigeria from 2015-2021: A review. *Therapeutic Advances in Infectious Disease*, 8.
<https://doi.org/10.1177/20499361211058252>
- [10]. NCDC, 2024, *Lassa Fever Situation Report*.
<https://ncdc.gov.ng/themes/common/files/sitreps/b23b25a04540c4c46323db392ad1941b.pdf>
- [11]. John Hopkins Medicine, 2024, *Clinical Research What is It*.
<https://www.hopkinsmedicine.org/research/understanding-clinical-trials/clinical-research-what-is-it>
- [12]. Scanlon, J. K., Wofford, L., Fair, A., & Philippi, D., 2021, Predictors of Participation in Clinical Research. *Nursing Research*, 70(4), 289.
<https://doi.org/10.1097/NNR.0000000000000513>
- [13]. Bay, A. A., Prizer, L., Orusa, A., Hart, A. R., Perkins, M. M., & Hackney, M. E., 2020, Effects of a Health Education and Research Participation Enhancement Program on Participation and Autonomy in Diverse Older Adults. *Gerontology and Geriatric Medicine*, 6, 233372142092495.
<https://doi.org/10.1177/2333721420924952>
- [14]. Kernéis, S., Koivogui, L., Magassouba, N., Koulemou, K., Lewis, R., Aplogan, A., Grais, R. F., Guerin, P. J., & Fichet-Calvet, E., 2009, Prevalence and Risk Factors of Lassa Seropositivity in Inhabitants of the Forest Region of Guinea: A Cross-Sectional Study. *PLOS Neglected Tropical Diseases*, 3(11), e548.
<https://doi.org/10.1371/JOURNAL.PNTD.0000548>
- [15]. Samuel Amoo, O., Ojonugwa Shaibu, J., Salu, O., Idigbe, I., Musa, A. Z., Famokun, G., Ezechi, O., Lawal Salako, B., Omilabu, S., & Audu, R., 2021, Comparative Assessment of Knowledge, Attitude/Practices and Prevention of Lassa fever among Community Dwellers and Contacts of Confirmed Patients in Endemic Areas of Ondo State, Nigeria. *European Journal of Medical and Health Sciences*, 3(4), 137–144.
<https://doi.org/10.24018/EJMED.2021.3.4.962>
- [16]. Cadmus, S., Taiwo, O. J., Akinseye, V., Cadmus, E., Famokun, G., Fagbemi, S., Ansumana, R., Omoluabi, A., Ayinmode, A., Oluwayelu, D., Odemuyiwa, S., & Tomori, O., 2023, Ecological

- correlates and predictors of Lassa fever incidence in Ondo State, Nigeria 2017–2021: an emerging urban trend. *Scientific Reports* 2023 13:1, 13(1), 1–15. <https://doi.org/10.1038/s41598-023-47820-3>
- [17]. Wogu, J. O., 2018, Mass media awareness campaign and the prevention of the spread of Lassa fever in the rural communities of Ebonyi State, Nigeria: Impact evaluation. *Journal of Public Health in Africa*, 9(3), 882. <https://doi.org/10.4081/JPHIA.2018.882>
- [18]. Premium Times, 2018, *Lassa fever: Doctors take sensitisation to markets as disease claims one in Osun* | Premium Times Nigeria. <https://www.premiumtimesng.com/regional/ssouth-west/258450-lassa-fever-doctors-take-sensitisation-markets-disease-claims-one-osun.html?tztc=1>
- [19]. Fatiregun, A., Isere, E., Dosumu, M., Agunbiade, O., & Onyibe, R., 2019, Lassa fever awareness and knowledge among community residents in Ondo State, Nigeria. *Journal of Community Medicine and Primary Health Care*, 31(2), 26–35.
- [20]. Pappas, C., 2013, *The Adult Learning Theory - Andragogy - of Malcolm Knowles - eLearning Industry*. <https://elearningindustry.com/the-adult-learning-theory-andragogy-of-malcolm-knowles>
- [21]. Chandra, N. L., Bolt, H., Dan-Nwafor, C., Ipadeola, O., Ilori, E., Namara, G., Olayinka, A. T., Ukponu, W., Iniobong, A., Amedu, M., Akano, A., Akabike, K. O., Okhwarobo, U., Fagbemi, S., Sampson, E., Newitt, S., Verlander, N. Q., Bausch, D. G., le Polain de Waroux, O., & Ihekweazu, C., 2021, Factors associated with delayed presentation to healthcare facilities for Lassa fever cases, Nigeria 2019: a retrospective cohort study. *BMC Infectious Diseases*, 21(1). <https://doi.org/10.1186/S12879-021-05822-4>
- [22]. Ipadeola, A. F., Olasehinde, G. I., Akinnola, O. O., Kolawole, O. M., Ejikeme, A. R., & Ipadeola, O. B., 2023, Factors associated with late presentation for Lassa fever treatment among symptomatic cases in Ondo State, Nigeria. *PAMJ-OH*. 2023; 10:6, 10(6). <https://doi.org/10.11604/PAMJ-OH.2023.10.6.39071>
- [23]. Adebimpe, W., 2015, Knowledge and Preventive Practices Against Lassa Fever among Primary Health Care Workers in Osogbo. *University of Mauritius Med J*, 21, 579–593.
- [24]. Picard, R., & Yeo, M., 2011, *Medical and health news information in the UK media: the current state of knowledge. A report of the Reuters Institute for the study of Journalism*.
- [25]. WHO, 2017a, July 31, *Lassa fever*. <https://www.who.int/news-room/fact-sheets/detail/lassa-fever>
- [26]. McCarthy, R., Gino, B., d'Entremont, P., Barari, A., & Renouf, T. S., 2020, The Importance of Personal Protective Equipment Design and Donning and Doffing Technique in Mitigating Infectious Disease Spread: A Technical Report. *Cureus*, 12(12), e12084. <https://doi.org/10.7759/CUREUS.12084>
- [27]. A. Holt *et al.*, “A mixed-methods analysis of personal protective equipment used in Lassa fever treatment centres in Nigeria,” *Infect. Prev. Pract.*, vol. 3, no. 3, p. 100168, Sep. 2021, doi: 10.1016/J.INFPIP.2021.100168.
- [28]. NETEC, 2022, June 13, *Lassa Fever: Biocontainment and PPE for Patient Care* | NETEC. <https://netec.org/2022/06/13/lassa-fever-patient-care-biocontainment-ppe/>
- [29]. Madziatera, D., Msofi, K. S., Phiri, T. V., Mkandawire, S. D., & Comber, A., 2020, Availability, Accessibility and Proper Use of Personal Protective Equipment in Wards at Queen Elizabeth Central Hospital (QECH) Blantyre, Malawi: An Observational Study. *Malawi Medical Journal*, 32(3), 124. <https://doi.org/10.4314/MMJ.V32I3.4>
- [30]. Kim, H., Hegde, S., Lafiura, C., Raghavan, M., Sun, N., Cheng, S., Rebholz, C. M., & Seidelmann, S. B., 2021, Access to personal protective equipment in exposed healthcare workers and COVID-19 illness, severity, symptoms and duration: a population-based case-control study in six countries. *BMJ Global Health*, 6(1), e004611. <https://doi.org/10.1136/BMJGH-2020-004611>
- [31]. Smither, A. R., Koninga, J., Kanneh, F. B., Foday, M., Boisen, M. L., Bond, N. G., Momoh, M., Sandi, J. D., Kanneh, L., Alhasan, F., Kanneh, I. M., Yillah, M. S., Grant, D. S., Bush, D. J., Nelson, D. K. S., Cruz, K. M., Klitting, R., Pauthner, M.,

Andersen, K. G., ... Garry, R. F., 2023, Novel Tools for Lassa Virus Surveillance in Peri-domestic Rodents. *MedRxiv*.

<https://doi.org/10.1101/2023.03.17.23287380>

[32]. Alope, C., Obasi, N. A., Aja, P. M., Emelike, C. U., Egwu, C. O., Jeje, O., Edeogu, C. O., Onisuru, O. O., Orji, O. U., & Achilonu, I., 2023, Combating Lassa Fever in West African Sub-Region: Progress, Challenges, and Future Perspectives. *Viruses*, 15(1). <https://doi.org/10.3390/V15010146>.

[33]. WHO, 2017b, July 31, *Lassa fever*. <https://www.who.int/news-room/fact-sheets/detail/lassa-fever>

[34]. Isere, E. E., Fatiregun, A. A., Omorogbe, N. E., & Oluwale, M. T., 2022, Preventive practices by

households against Lassa fever transmission in Ondo State, Southwest, Nigeria. *The Pan African Medical Journal*, 43, 176.

<https://doi.org/10.11604/PAMJ.2022.43.176.32315>

[35]. Nagai, M., 2020, Relationships among Lifestyle Awareness, Age, and Lifestyle-related Diseases in Healthy Japanese Community Residents. *Asian/Pacific Island Nursing Journal*, 5(2), 103. <https://doi.org/10.31372/20200502.1092>

[36]. Gever, V. C., & Ezeah, G., 2020, The media and health education: Did Nigerian media provide sufficient warning messages on coronavirus disease? *Health Education Research*, 35(5), 460–470. <https://doi.org/10.1093/HER/CYAA020>