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Knowledge, Attitude and Prevention of Lassa fever Transmission among Women in Nnewi North Lga, Anambra State, Nigeria

Solomon Chetachukwu Areji [a], Kelechi Raphael Onyenemezu [b*], John Chiedu Ubah [c], Jennifer Makuochukwu Akosa [b], Chukwuemelie Darlington Okeke [d], Emmanuel Izuchukwu Onyenemezu [e], Hyginus Echezona Okonkwo [f], Obinna Valentine Ikwuka [b] and Tobechukwu Chinenye Ezike [b]

[a] Department of Paediatrics, Nnamdi Azikiwe University Teaching Hospital, Nnew, Nigeria.
[b] College of Public Health, East Tennessee State University, Johnson City, USA.
[c] Department of Internal Medicine, Royal Wolverhampton NHS Trust, Wolverhampton, UK.
[d] Department of Internal Medicine, Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria.
[e] School of Health and Live Sciences, Teesside University, England.
[f] Department of Pharmacology, Therapeutics and Toxicology, University of Lagos, Nigeria.

Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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Original Research Article

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**Corresponding author: Email: onyenemezuk@gmail.com;*

ABSTRACT

Purpose: Lassa fever is a disease of public health concern associated with significant morbidity and mortality. It is noted to be endemic in the west-African Lassa fever belt with seasonal variations usually associated with epidemics. Nigeria among other countries is known to suffer from this. This study aims to determine the Knowledge, attitude, and prevention of Lassa Fever transmission among women in Nnewi North LGA of Anambra State and contributory factors.
Methodology: A cross-sectional study conducted among women in Nnewi between 1st to 30th September, 2022. Data was collected using pretested interviewer-administered questionnaire among 252 respondents. It was analyzed with SPSS version 25.0.
Results: Their mean age was 33.40 years ranging from 18-69 years. Overall, 80.2% of the respondents had good knowledge on Lassa fever, 77.8% had good attitude towards prevention and 84.9% showed a good level of practice of its prevention. Educational level was a statistically significant factor in all these. 21% of respondents reported knowledge through health workers.
Conclusion: There is a high level of knowledge, attitude, and transmission prevention among women resident in Nnewi with educational status being a major determinant. This will significantly help to reduce the burden of and transmission of the disease though the means of awareness differed among different individuals.
Practical Implication: There is a need to improve public health awareness by health workers in order to improve the integrity and content of the population's health education.

Keywords: Anambra; attitude; hemorrhagic fever; knowledge; Lassa fever; prevention; virus.

1. INTRODUCTION

Lassa fever (LF) also called Lassa hemorrhagic fever is a disease caused by infection with a zoonotic virus called Lassa virus (LASV), which is a bi-segmented single stranded RNA virus of the family, Arenaviridae [1]. The virus was first described in the 1950s, it was not identified until 1969 and was subsequently named after a town in the present Borno state, Nigeria where the first case of the disease was recorded when two Nurses died of a seemingly mysterious disease in Lassa village, Borno State, Nigeria [2-4]. LF is an acute and sometimes fatal viral haemorrhagic disease which occurs along the Lassa belt in West Africa and the disease is known to be endemic in Guinea, Liberia, Nigeria and Sierra Leone with recurrent seasonal epidemics. Outbreaks have been reported in Ghana, and serological evidence of human infection has been found in Ivory Coast, Senegal and Mali.

The primary host of Lassa virus is a rodent *Mastomys natalensis*, also referred to as 'multimammate rat'. Once infected, Mastomys rats do not become ill but can shed the virus. Humans become infected primarily through contact with the urine, faeces, or blood of an infected rat or through hunting and inadequate processing of infected rats for consumption. Eating of food and inhalation of contaminated dust containing body secretions of infected rats are other recognized modes of transmission of the infection to human [1,3,4].

Secondary person-to-person transmission can occur through exposure to infected persons' blood or bodily secretion of infected cases (dead or alive), percutaneous or per-mucosal exposure to blood and other infected body fluids like urine, saliva or faeces or other secretions from the infected person.[4,2] It has also been reported to have been transmitted through sexual intercourse. A recent study reported presence of viral nuclei acid in semen up to 103 days after onset [1].

This spread between humans can occur either in the community or during the care of infected people in healthcare settings [1]. The rural communities are mainly affected as occasioned by socio-cultural practice, poor environmental hygiene, and ignorance [2], while nosocomial transmission of Lassa fever in healthcare facilities represent a significant burden on the healthcare system.[5] Infection prevention and control (IPC) in healthcare settings has been documented as an important factor in controlling potential outbreaks of Lassa fever [5,6].

The disease affects humans of all ages and both sexes, though 80% of infected people are asymptomatic [2]. Lassa fever presents initially with symptoms and signs that are common with other viral and bacterial infections and

indistinguishable from those of febrile illnesses such as typhoid, malaria and other viral haemorrhagic diseases such as Ebola. All age groups are susceptible and it has an incubation period of 6-21 days. It is difficult to diagnose clinically, however, case definition of suspected Lassa fever consists of known exposure to a person who has had LF, fever >38^{0}C that does not respond to antimalarial and antibiotic drugs for less than three weeks with absence of signs of local inflammation, and any two major signs (bleeding, swollen neck or face, conjunctival or subconjunctival hemorrhage, spontaneous abortion, petechial or haemorrhagic rash, new onset tinnitus or altered hearing, persistent hypotension) or one major and two minor signs (headache, sore throat, vomiting, diffuse abdominal pain/tenderness, chest/retrosternal pain, cough, diarrhea, generalized myalgia or arthralgia or profuse weakness). Swollen face and neck are classic signs of Lassa fever but only occur in about 10% cases [4,3]. Diagnosis is by blood samples which are examined using LASV specific real time reverse-transcriptase polymerase chain reaction (RT-PCR) [1,7]. Death may occur within two weeks after symptom onset due to multi-organ failure. While approximately 15%-20% of patients hospitalized for Lassa fever die from the illness, only 1% of all lassa virus infections result in death [5]. The major control strategy is the control of the rodents around dwellings, avoiding of rats consumption, and contact [1].

A single case of Lassa fever is regarded as an outbreak, and a suspected case of Lassa fever is defined as illness with gradual onset with one or more of the following: Malaise, fever, headache, sore throat, cough, nausea, vomiting, diarrhea, myalgia, chest pain hearing loss, and a history of contact with excreta of rodents or with a case of Lassa fever, while a confirmed case of Lassa fever is a suspected case that is laboratory confirmed (positive IgM antibody, PCR, or virus isolation) or epidemiologically linked to a laboratory-confirmed [8].

Currently, there are no vaccines against LASV. Although, off-label treatment consider the use of ribavirin, an expensive treatment that is effective when administered for the first six days after the onset of symptoms,[1] though the use of ethnomedicinal remedies in treatment of people and animals infected with viral infections have been documented [3].

The annual incidence of LF in endemic West African regions is estimated as 100,000 to 300,000 cases with about 5000 deaths and 58 million people at risk. Twenty percent of infected individuals require hospitalization while 80% are asymptomatic infections. The case fatality rate of hospitalized cases ranges from 15 to 20% in Africa [1,3,8].

In Nigeria, about two-third of the states have been noted to record cases of Lassa fever over the course of the past ten years with an increasing trend in incidence.[9] Since December 2016, Nigeria has reported 2787 confirmed cases of this virus; a total of 298 confirmed cases were observed in 2017, In 2018, a total of 528 cases were confirmed, in 2019 and 2020, the number of confirmed cases were 796 and 1165 respectively.[1] Those in the age-group 21–40 years were majorly affected (47%) with a male to female ratio of 1:1. Cases occur round the year but there is a notable seasonal peak during the dry season. Important hotspot states for these outbreaks include Edo, Ondo and Ebonyi states [9,10]. The increasing number of cases has also significantly led to increasing mortality rate due to lassa fever [11].

It has been postulated that increasing health communication messages on Lassa fever may result in improved behaviour of people towards the infection. Thus, there has been a call for community interventions to improve the knowledge of Lassa fever among community members. This is based on the expectation that good knowledge of Lassa fever and adequate preventive measures for the disease could reduce the rate and spread of Lassa virus infection [2]. There is, however, evidence from studies suggesting that communities have good knowledge, favorable attitude, and optimal preventive practices on Lassa fever in Nigeria [12-15]. Education, socioeconomic status and religion were factors associated with some of these findings [16-18].

Lassa fever as a disease, has assumed an endemic and public health emergency status[3] evidenced by its steady contribution to hospital admissions which increased from 0.3% in 2001 to 3.4% in 2018, the contribution to deaths rose from 1.5 to 8.8% over the same period [11].

Owing to the rising number of lassa fever cases each year, this study will help ascertain the level to which women, who in most homes are in charge of the foodstuff (buying, storing and/or cooking) are aware of the important role they play in preventing or decreasing the rising case

of LF. Furthermore, findings from this research could also be used to deepen the impact of the multi-sectoral One Health approach for surveillance, early detection of spill over into human populations, and rapid public health emergency response during outbreaks of LF[10] through furtherance of campaigns/ awareness on LF in community gatherings especially those involving women such as in churches, primary health centres, etc. The aim of the study is to determine the knowledge, attitude, and prevention of Lassa Fever transmission among women in Nnewi North LGA and factors that may affect these outcomes.

2. METHODOLOGY

2.1 Area OF Study

The Study was conducted in Nnewi North a Local Government Area in Anambra State, south-eastern Nigeria. Nnewi is the only town that make up Nnewi North LGA. It has four communities (sub-towns) that make up the one-town local government, which includes; Otolo, Uruagu, Umudim and Nnewichi. It has an estimated land area of 520 km^2 (200 square miles) and an estimated population of 391,227 according to 2006 Nigerian census.

The population is predominantly business owners and being a major industrial and commercial hub in Africa, Nnewi experiences voluminous financial activities, therefore hosts major banks, and other financial institutions. Industries are dotted around the city and adjoining towns. Palm oil, cosmetics, motor, and motorcycle spare parts, books, and stationery, textiles, electric cables, and so on are produced in commercial quantity in the area.

2.2 Study Design

A cross-sectional descriptive study design was adopted for this work.

2.3 Study Population

The population comprised of women living in Nnewi North LGA, Anambra State, Nigeria.

2.4 Inclusion Criteria and Exclusion Criteria

Inclusion Criteria: Respondent must be a woman residing in Nnewi North, LGA.

Exclusion Criteria: Elderly women 70 years and above, and women who are too sick to participate in the study.

2.5 Sample Size Determination

The formula below will be used to calculate the sample size

$$N= Z^2PQ / d^2$$

where

N is the minimum sample size:
z is the standard normal deviate (1.96) at 95% confidence level.
p is the prevalence = 17.5%[20], (~ 0.18)
q= 1-p (1- 0.18) = 0.82
d is the degree of precision is usually set at 5% (0.05)

$$N = \frac{(1.96)^2 \times 0.18 \times 0.82}{(0.05)^2}$$

N=226.80

Therefore, anticipating a non-response rate (f) if 10% as used in a previous study [12], the adjusted Sample size would be

$$Ns = \frac{N}{1-f} = \frac{226.80}{1-0.1} = \frac{226.80}{0.9} = 252$$

2.6 Sampling Technique

A multi – stage sampling technique was used for the purpose of this study.

In the first stage, a simple random-sampling technique of balloting was used and two communities were selected out of the four communities that make up Nnewi North.

The second stage involved selection of wards by simple random-sampling technique involving balloting, two wards were selected from each of the two selected communities.

In the third Stage, a simple random technique involving balloting was used to select one village from each of the two selected wards.

Stage four involved selection of two clusters by a simple random sampling system of balloting from each of the selected village.

Stage five involved selection of respondents across each of the selected clusters and this

involved choosing consecutive houses from which women will be recruited for the study until the required sample size is obtained.

2.7 Data Collection

Data was collected between 1st to 30th September, 2022 through a pre-tested semi structured interviewer-administered, questionnaire after seeking verbal consent following a proper orientation of the participants on the objectives of the study.

2.8 Data Management

Data was analyzed using SPSS version 25. Descriptive and inferential statistics were applied where necessary. Numerical variables were reported as mean, median and standard deviation, while categorical data will be reported using proportion and percentages. Respondents were assessed as having good or poor knowledge, attitude, or prevention of Lassa fever transmission based on the correctness or wrongness of 50% of their responses for each category. Statistical level of significance was set at 0.05.

3. RESULTS

252 women from Nnewi-North Local Government Area were sampled and the result obtained are presented in the tables and figures below.

From Table 1, there were more respondents between the age ranges of 20-29 years and 30-39 years, with a prevalence of 99 (39.3%) and 62 (24.6%) respectively; however the average age of the respondents were 33.4±13.2 years. Most of the respondents were Igbo by tribe, 230 (91.3%); Christian, 222 (88.1%); business owner, 171 (67.9%); married, 139 (54.0%) and completed secondary school education, 142 (56.4%). Among those who were married, most of their husbands were business owners also, 101 (72.7%) and had secondary school as their highest educational level attained, 76 (54.7%).

Table 1. Shows the socio-demographics features of the respondents

Variable	Frequency	Percentage
Age(Years)		
>20.0	20	7.9
20.0 - 29.0	99	39.3
30.0 - 39.0	62	24.6
40.0 - 49.0	36	14.3
50.0 - 59.0	19	7.5
60.0 - 69.0	14	6.4
Average age in years	***33.40±13.16***	
Tribe		
Igbo	230	91.3
Hausa	19	7.5
Yoruba	3	1.2
Religion		
Christianity	222	88.1
Islam	26	10.3
Traditionalist	4	1.6
Occupation		
Civil servant	20	7.9
Business Owner	171	67.9
Student	55	21.8
Unemployed	6	2.4
Marital Status		
Single	102	41.7
Married	139	54.0
Divorced/Separated	2	0.8
Widowed	9	3.6

Variable	Frequency	Percentage
Educational Level attained		
Non-formal	4	1.6
Primary School	23	9.1
Secondary School	142	56.4
Tertiary	83	32.9
Occupation of Husband		
Civil Servant	28	20.1
Business Owner	101	72.7
Student	4	2.9
Unemployed	6	4.3
Educational status of Husband		
Non-formal	3	2.2
Primary School	20	14.4
Secondary school	76	54.7
Tertiary	40	28.8

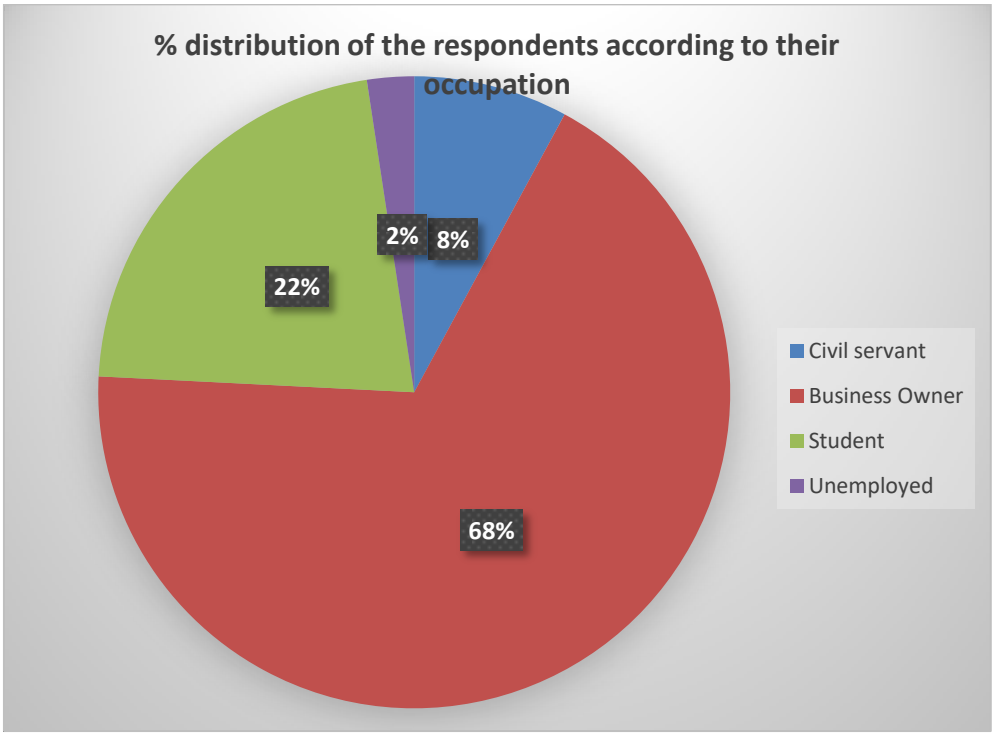

Fig. 1. Shows the % distribution of the respondents according to their occupation

From Table 2, more than four-fifth of the respondents have heard of Lassa fever, 217(86.1%) and about two-third believe that Lassa fever virus exist, 176(69.8%). Most of those who have heard about Lassa fever got their information from radio/television and social media, with a prevalence of 161 (63.9%) and 70 (27.8%) respectively. Less than half of them knew that Lassa fever were caused by a virus, 112 (44.4%); however a great majority of them knew it was transmitted by rats, 214 (84.9%). Only 115(45.6%) knew that Lassa fever can be transmitted from person to person and also fewer percentage knew that a person can be infected with Lassa fever and still not show any symptoms, 99 (39.3%). The routes identified by the respondents through which Lassa fever can be transmitted to humans were contact with urine/faeces of infected rats, 163 (64.7%) and contacts with blood/secretions of infected rats, 129 (51.2%). The common symptoms of Lassa fever infections identified were fever, 143 (56.8%); Nausea/vomiting, 85 (33.7%) and diarrhoea, 52 (20.6%). A great majority agreed that a door not well fixed can lead to invasion of rat from the outside, 209 (82.9%). The factors

identified to predispose to Lassa fever include poor storage of food items, 165 (65.5%); eating of rodents, 129 (51.2%) and insanitary disposal of waste, 65 (25.8%). A great majority believe a drug is available for the treatment of Lassa fever, 155 (61.5%); that all age groups are at risk of Lassa fever, 199 (79.0%); that Lassa fever cannot be treated at home, 178(70.6%); that Lassa fever is preventable, 206 (81.7%); and that a vaccine is currently available for preventing Lassa fever, 150 (59.5%). However, there were an almost equal distribution between those who have heard of people that survived Lassa fever with a prevalence of 111 (44.0%) and 105 (41.7%) for those who have heard and those who had not, respectively.

Overall, four-fifth of the respondents had good knowledge of Lassa fever transmission with a prevalence of 202 (80.2%).

Table 2. Shows the respondents' knowledge of lassa fever transmission

Variable	Frequency	Percentage
Have you heard of Lassa Fever?		
Yes	217	86.1
No	35	13.9
Do you believe Lassa fever exists?		
Yes	176	69.8
No	72	28.6
No response	4	1.6
If yes, What was your source of information?		
Radio/Television	161	63.9
Social Media	70	27.8
Family/Friends	46	18.3
Healthcare worker	54	21.4
School	6	2.4
Church	1	0.4
Lassa fever is caused by?		
Virus	112	44.4
Bacteria	23	9.1
Fungi	2	0.8
I don't know	82	32.5
Lassa fever is transmitted by?		
Rats	214	84.9
Mosquitoes	2	0.8
Flies	1	0.4
I don't know	2	0.8
Is person to person transmission possible?		
Yes	115	45.6
No	42	16.7
I don't know	60	23.8
Can an infected person be asymptomatic?		
Yes	99	39.3
No	63	25.0
I don't know	54	21.4
Mode of transmission of Lassa fever		
Contact with blood/secretions of infected rats	129	51.2
Contact with urine/faeces of infected rats	163	64.7
Eating bush meat	61	24.2
Exposure to infectious body fluid	37	14.7
sexual intercourse	36	14.3
Caring for Lassa fever patients	49	19.4
Inhalation of viral particles	15	6.0
Handling of corpses of infected patient	49	19.4
curses and spells	8	3.2

Variable	Frequency	Percentage
Symptoms of Lassa fever infections?		
Fever	143	56.8
Nausea/Vomiting	85	33.7
Diarrhoea	52	20.6
Sore Throat	19	7.5
Cough	2	0.8
Headache	9	3.6
Tiredness	4	1.6
Nose Bleed	1	0.4
Rashes	4	1.6
Muscle Pain	1	0.4
Can a poorly fixed lead to rat invasion?		
Yes	209	82.9
No	7	2.8
Factors predisposing to Lassa fever?		
Poor food storage	165	65.5
Poor compliance to standard precautions	55	21.8
Traditional corpse-handling	29	11.5
Contact with infected persons	63	25.0
Eating rodents	129	51.2
Insanitary waste disposal	65	25.8
Any drug treatment for Lassa fever?		
Yes	155	61.5
No	61	24.2
All age groups are at risk of Lassa fever		
Yes	199	79.0
No	17	6.7
Can Lassa fever be treated at home?		
Yes	38	15.1
No	178	70.6
Is Lassa fever preventable?		
Yes	206	81.7
No	10	4.0
Have heard of people that have survived Lassa fever?		
Yes	111	44.0
No	105	41.7
Is there a vaccine currently available for preventing Lassa fever?		
Yes	150	59.5
No	66	26.2
Level of knowledge of Lassa Fever transmission		
Poor knowledge (score <50.0%)	50	19.8
Good knowledge (score ≥50.0%)	202	80.2

From Table 3, about four-fifth of the respondents think Lassa fever is a serious illness, 204(81.0%). About 67.1% of them alluded to having rats/rodents in and around their house; and about 59.1% were concerned about possible infection of Lassa fever from rats around their house.

Majority believe there's need for them/people around their area to think of measures to avoid Lassa fever infection, 198(78.6%). Close to half of the respondents claimed they will show some discriminatory attitude towards people suspected of having Lassa fever, 113(44.8%); however only a handful claimed they will not discriminate, 35(13.9%).

As regards their attitude towards treatment options of people infected/suspected of having Lassa fever, a great percentage of them agreed that if a person has been diagnosed with Lassa fever, he/she must be admitted in a Lassa fever

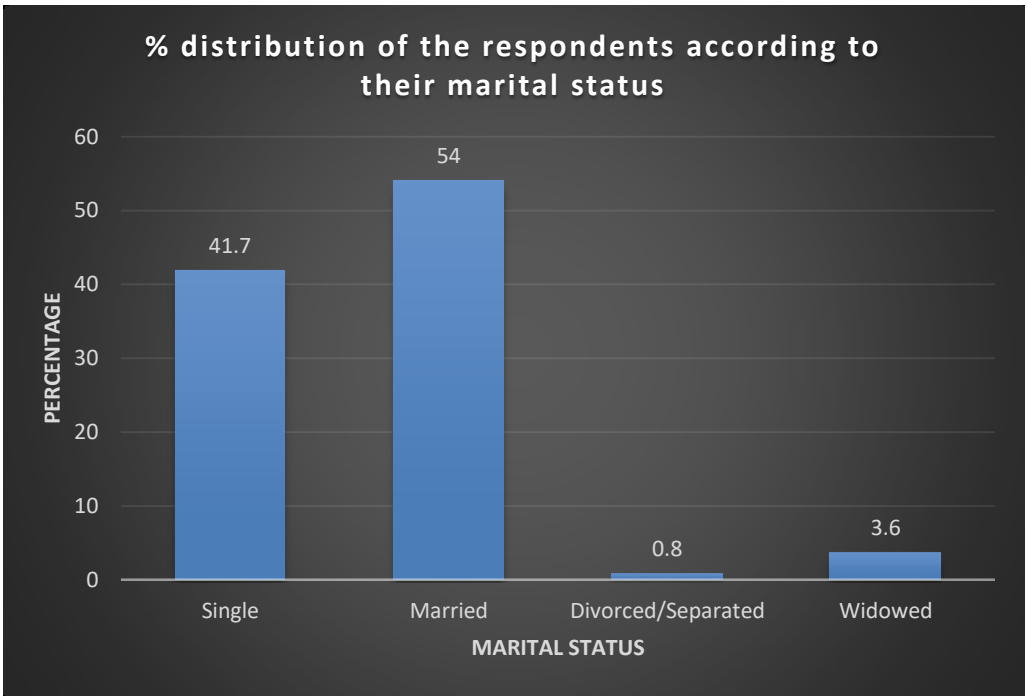

Fig. 2. Shows the % distribution of the respondents according to their marital status

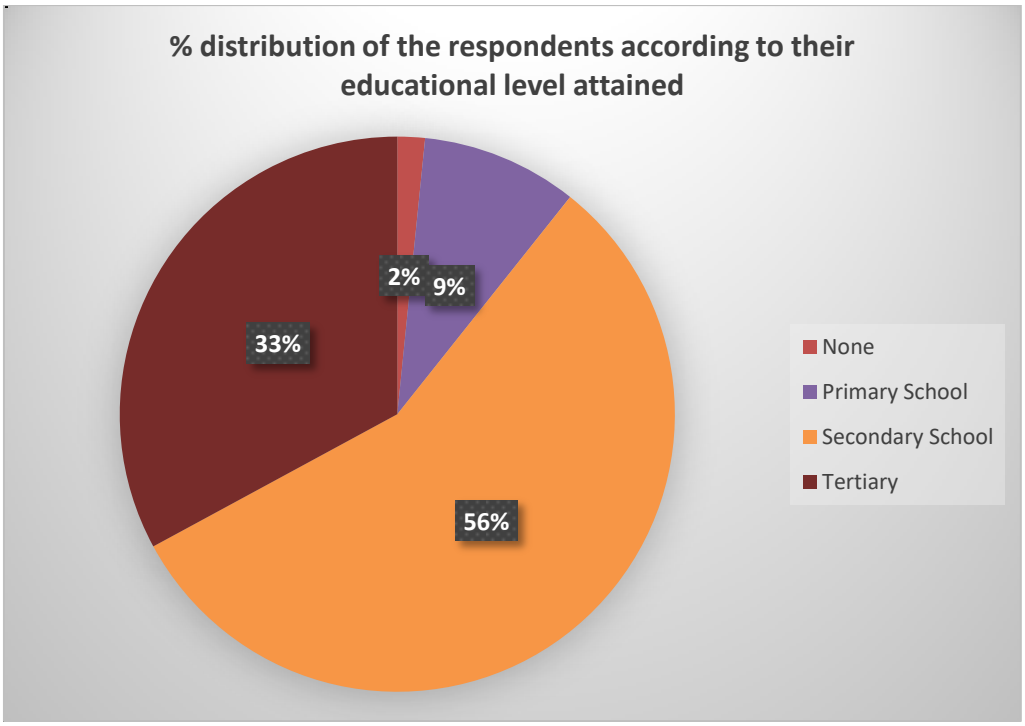

Fig. 3. Shows the % distribution of the respondents according to their educational level attained

treatment centre, 195(77.4%) and that people who have direct contact with a person who has been diagnosed with Lassa fever must be quarantined for some weeks, 130(51.6%).

With respect to attitude towards vaccines against Lassa fever, about two-third of the respondents agreed to take an approved vaccine that could prevent Lassa fever, 160(63.5%);

however a lower percentage agreed to give an approved vaccine to their children/husbands, 99(39.3%).

Overall, a great majority of the respondents have good attitude towards Lassa fever transmission, with a prevalence of 196(77.8%).

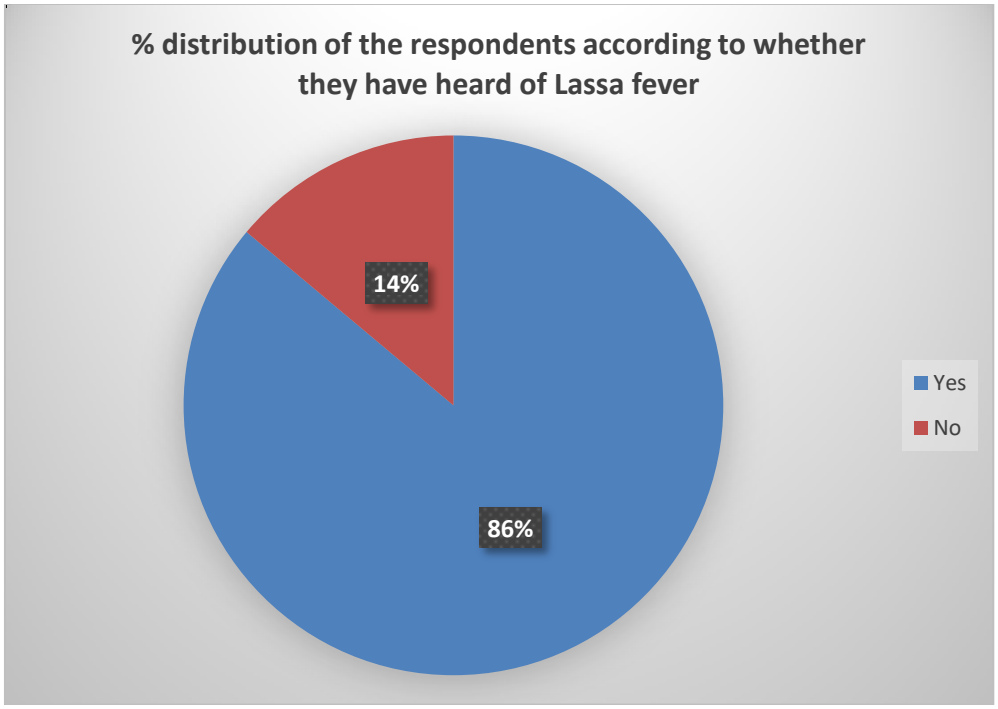

Fig. 4. Shows the % distribution of the respondents according to whether they have heard of lassa fever

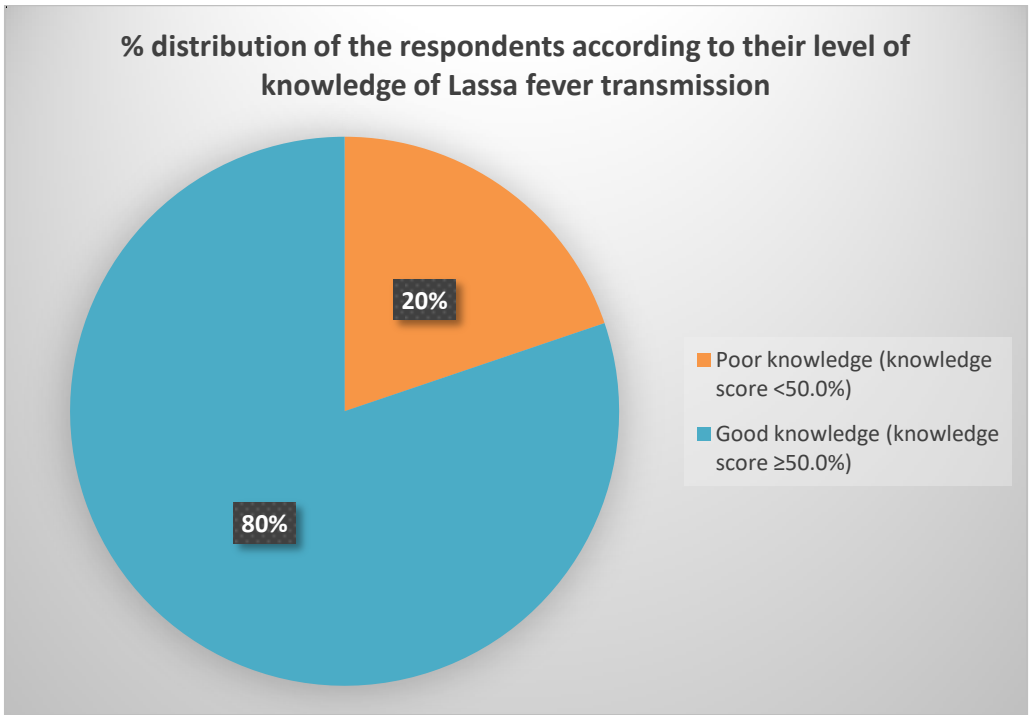

Fig. 5. Shows the % distribution of the respondents according to their level of knowledge of lassa fever transmission

Table 3. Shows the respondents' attitude to lassa fever transmission

Variable	Frequency	Percentage
Is Lassa fever a serious illness?		
Yes	204	81.0
No	12	4.8
Are there rodents in and around your house?		
Yes	169	67.1
No	47	18.7
Are you concerned about infection of Lassa fever from these rodents?		
Yes	149	59.1
No	67	26.6
Is there any need for you to think of measures to avoid Lassa fever infection?		
Yes	198	78.6
No	17	6.7
Attitude to people suspected to be infected with Lassa fever		
Keep the information secret if a family member contracts it	59	23.4
Avoid an infected shop keeper	102	40.5
Discriminate toward suspected individuals	113	44.8
Contact health care workers	6	2.4
Not discriminate	35	13.9
Attitude towards treatment of infected persons		
Admit into a Lassa fever treatment centre	195	77.4
Quarantine direct contacts	130	51.6
Attitude toward Lassa fever vaccination		
Accept to take an approved vaccine	160	63.5
Accept to vaccinate family members	99	39.3
Reject vaccination due to religious belief	34	13.5
Reject vaccination of family members	39	15.5
Level of attitude towards Lassa fever transmission		
Poor attitude (score < 50.0%)	56	22.2
Good attitude (score ≥50.0%)	196	77.8

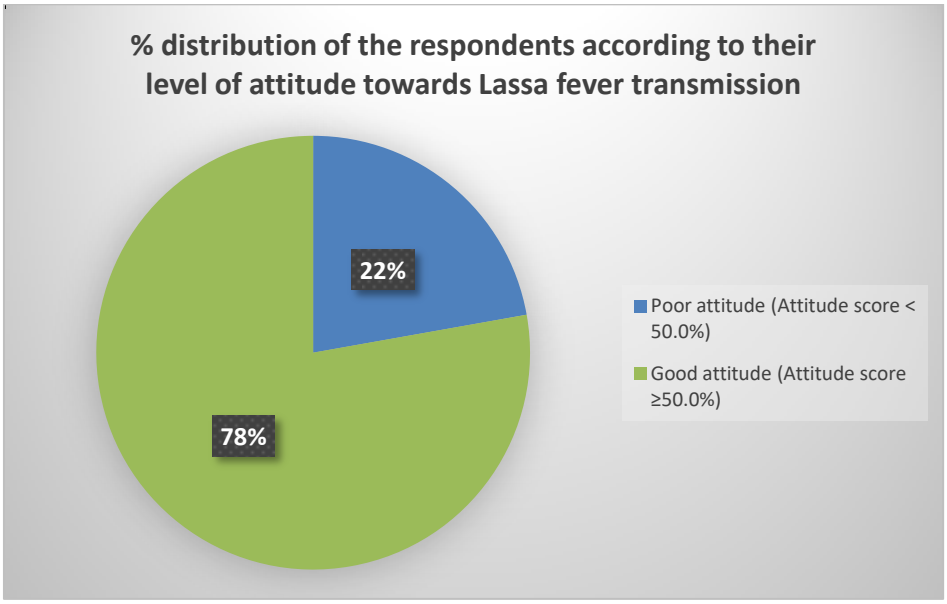

Fig. 6. Shows % distribution of the respondents according to their level of attitude towards lassa fever transmission

Table 4. Shows the respondents' practices towards prevention of lassa fever transmission

Variable	Frequency	Percentage
Avoid contact with infected person		
Yes	177	70.2
No	39	15.5
Avoid food contaminated by rat		
Yes	212	84.1
No	4	1.6
Regular hand washing		
Yes	180	71.4
No	36	14.3
Ensure good environmental hygiene		
Yes	210	83.3
No	6	2.4
Adequate food storage		
Yes	214	84.9
No	2	0.8
Rodents extermination		
Yes	196	77.8
No	20	7.9
Clearing bushes around household		
Yes	204	81.0
No	11	4.4
Proper refuse disposal		
Yes	203	80.6
No	13	5.2
Avoid rodent consumption		
Yes	199	79.0
No	17	6.7
Avoid bush burning		
Yes	70	27.8
No	146	57.9
Avoid bush-meat consumption		
Yes	169	67.1
No	47	18.7
Fix holes in walls and nets at home		
Yes	180	71.4
No	36	14.3
Poor prevention practice(< 50.00)	38	15.1
Good prevention practice(≥50.00)	214	84.9
Average prevention practice	***76.06±33.45***	

From Table 4, the preventive practices towards Lassa fever transmission identified by majority of the respondents were avoiding contact with people infected with Lassa fever, 177(70.2%); avoiding food contaminated by rats, 212(84.1%); regular hand washing, 180(71.4%); ensuring good environmental hygiene, 210(83.3%); proper storage of food, 214(84.9%); destroying all rats, 196(77.8%); clearing of bushes around houses, 204(81.0%), proper refuse disposal, 203(80.6%); avoiding rat consumption, 199(79.0%) avowing bush-meat consumption, 169(67.1%); and fixing holes in walls and nets in the house, 180(71.4%); however, a great majority do not believe that avoiding bush burning is a preventable measure towards Lassa fever transmission, 146(57.9%). On a general note, a huge percentage of the respondents 84.9% had showed a good preventive practice.

Table 5. Shows the relationship between some of the respondents' socio-demographics and knowledge of lassa fever transmission

		Respondents' knowledge of Lassa Fever Transmission					
		Poor knowledge	**Good knowledge**	**Total**	**Chi-square ($\chi 2$)**	**df**	**p-value**
Age(Years)	< 20.0	6(30.0%)	14(70.0%)	20	4.27	6	0.64
	20.0 - 29.0	19(19.2%)	80(80.8%)	99			
	30.0 - 39.0	9(14.5%)	53(85.5%)	62			
	40.0 - 49.0	7(19.4%)	29(80.6%)	36			
	50.0 - 59.0	4(21.1%)	15(78.9%)	19			
	60.0 - 69.0	5(31.3%)	11(68.7%)	16			
	Total	**50**	**202**	**252**			
Highest educational Level attained	Non-formal	2(50.0%)	2(50.0%)	4	11.63	3	0.009
	Primary School	8(34.8%)	15(65.2%)	23			
	Secondary School	32(22.5%)	110(77.5%)	142			
	Tertiary	8(9.6%)	75(90.4%)	83			
	Total	**50**	**202**	**252**			
Occupation	Civil servant	1(5.0%)	19(95.0%)	20	6.45	3	0.09
	Business Owner	36(21.1%)	135(78.9%)	171			
	Student	10(18.2%)	45(81.8%)	55			
	Unemployed	3(50.0%)	3(50.0%)	6			
	Total	**50**	**202**	**252**			

Table 6. Shows the relationship between some of the respondents' socio-demographics and attitude towards lassa fever transmission

		Respondents' Attitude towards Lassa Fever Transmission					
		Poor knowledge	**Good knowledge**	**Total**	**Chi-square ($\chi 2$)**	**df**	**p-value**
Age(Years)	< 20.0	5(25.0%)	15(75.0%)	20	4.10	6	0.66
	20.0 - 29.0	20(20.2%)	79(79.8%)	99			
	30.0 - 39.0	12(19.4%)	50(80.6%)	62			
	40.0 - 49.0	7(19.4%)	29(80.6%)	36			
	50.0 - 59.0	6(31.6%)	13(68.4%)	19			
	60.0 - 69.0	6(37.5%)	10(62.5%)	16			
	Total	**56**	**196**	**252**			
Highest Educational Level attained	Non-formal	3(75.0%)	1(25.0%)	4	16.97	3	0.001
	Primary School	9(39.1%)	14(60.9%)	23			
	Secondary School	35(24.6%)	107(75.4%)	142			
	Tertiary	9(10.8%)	74(89.2%)	83			
	Total	**56**	**195**	**252**			
Occupation	Civil servant	1(5.0%)	19(95.0%)	20	6.17	3	0.10
	Business Owner	44(25.7%)	127(74.3%)	171			
	Student	9(16.4%)	46(83.6%)	55			
	Unemployed	2(33.3%)	4(66.7%)	6			
	Total	**56**	**196**	**252**			

Table 7. Shows the relationship between some of the respondents' socio-demographics and preventive practices towards lassa fever transmission

		Respondents' prevention practices towards Lassa Fever Transmission					
		Poor prevention practice	**Good prevention practice**	**Total**	**Chi-square ($\chi 2$)**	**df**	**p-value**
Age(Years)	< 20.0	4(20.0%)	16(80.0%)	20(100.0%)	3.32	6	0.77
	20.0 - 29.0	13(13.1%)	86(86.9%)	99(100.0%)			
	30.0 - 39.0	8(12.9%)	54(87.1%)	62(100.0%)			
	40.0 - 49.0	6(16.7%)	30(83.3%)	36(100.0%)			
	50.0 - 59.0	3(15.8%)	16(84.2%)	19(100.0%)			
	60.0 - 69.0	4(25%)	12(75%)	16(100.0%)			
	Total	38(15.1%)	214(84.9%)	252(100.0%)			
Highest Educational Level attained	Non-formal	1(25.0%)	3(75.0%)	4(100.0%)	16.13	3	0.001
	Primary School	9(39.1%)	14(60.9%)	23(100.0%)			
	Secondary School	23(16.3%)	118(83.7%)	141(100.0%)			
	Tertiary	5(6.0%)	78(94.0%)	83(100.0%)			
	Total	38(15.1%)	214(84.9%)	252(100.0%)			
Occupation	Civil servant	1(5.0%)	19(95.0%)	20(100.0%)	4.37	3	0.22
	Business Owner	29(17.0%)	142(83.0%)	171(100.0%)			
	Student	6(10.9%)	49(89.1%)	55(100.0%)			
	Unemployed	2(33.3%)	4(66.7%)	6(100.0%)			
	Total	38(15.1%)	214(84.9%)	252(100.0%)			

With respect to age(years) and occupation in relation to their level of knowledge of Lassa fever transmission, those within the age range of 30-39 years and civil servants had better knowledge; however this was not statistically significant (p-value >0.05). on the other hand, those with tertiary education had better knowledge and the difference in knowledge with respect to highest educational level attained was statistically significant (p-value <0.05) (Table 5).

With respect to the relationship between age(years) and occupation with the respondents' attitude towards Lassa fever transmission, those within the age range of 20-29 years and 30-39 years and civil servants had better attitude towards Lassa fever transmission, however this was not statistically significant.(p-value>0.05) (Table 6).

On the hand, those with tertiary education has better knowledge. Moreover, the higher the educational level attained, the better the attitude towards Lassa fever transmission and this was statistically significant (p-value <0.05).

With respect to the relationship between age(years) and occupation with the respondents' preventive Practice towards Lassa fever transmission, those within the age range of 20-29 years and 30-39 years and civil servants had better preventive practice towards Lassa fever transmission, however this was not statistically significant.(p-value>0.05) (Table 7).

On the hand, those with tertiary education has better preventive practice. Moreover, the higher the educational level attained, the better the preventive practice towards Lassa fever transmission and this was statistically significant (p-value <0.05).

4. DISCUSSION

More than four-fifth of the respondents have heard of Lassa fever. This is in keeping with findings from similar studies carried out in a rural community which recorded a high proportion of its respondent as having heard of Lassa fever [2,12]. Most of those who have heard about Lassa fever got their information from radio/television and social media. This is likely due to the ease of access to these mass media tools given both the technological advancements of the current time and some form of financial stability among most of the respondents who identified either as student, business owners, or civil servants. Healthcare workers constituted a small percentage of the body of information on Lassa fever by the respondents, and it could be inferred that healthcare workers have not been strategic and fully involved in information dissemination about lassa fever. This finding corroborates that noted in a study carried out in Ebonyi State which stated that less than a quarter of the respondents have heard of Lassa fever from a health care worker [12]. A similarly low percentage was also obtained in a study in North central Nigeria [16]. However, another study had noted that more than half of the respondents alluded to having heard about Lassa fever from health care workers [2]. This study also noted that less than half of the participants knew that lassa fever is caused by a virus. This may be due to a combination of gap in information dissemination including a possible lack of adequate translation of the word "virus" to the native tongue of the respondents as majority identified as business owners. A little more than four-fifth of respondents knew that Lassa fever is transmitted by rats. This is considerably higher than values gotten from similar studies by Awosanya et al with 56.9% and 80% of respondent from affected local community and unaffected university community respectively [8], and a slightly lower value of 74.6% by Nwonwu et al. [12]. A higher value was however observed in a similar study by Fatiregun et al which reported 93.1% [13].

Greater than two-thirds of the respondents had good knowledge of Lassa fever transmission, good attitude, and good preventive practices. These were all noted to have a statistically significant association with their level of education. The association between these outcomes and age, and occupation was not statistically significant. This is similar to findings from two other studies which both showed a statistically significant relationship between Knowledge and education level [15,18], but not in agreement with the finding which showed a statistical significance between occupation of respondents and their knowledge of Lassa fever.[18] This dissonance can be attributed to the fact that most of the respondents in that study were civil servants unlike in this study where majority were business owners.

It also corroborates the study carried out in Kaduna State which showed that positive attitude towards LF improved with level of education of respondents and vice versa [16]. This was however not the case in a study carried out

among University students in Benin as there was no significant statistical relationship between attitude and education level of the respondents [3]. This could be due to the fact that majority of the respondents in that study were first year students with only basic education and a poor knowledge of LF as compared to other respondents in higher class, with higher education and good knowledge.

Lower proportions of respondents with good preventive practice were observed in a few studies [4,8], but other studies in the south-south, south-west, and north-central showed good preventive practice among respondents [3,13,16].

The limitations of this study include its low sample size. A larger sample size would increase the power of the study. There is also a tendency of a social desirability bias by respondents to give responses based on what they assess to be a generally accepted view instead of their own perception especially as regards attitude and prevention strategies. A strength of this study is that it is population based and can be generalizable. The stratified sampling technique employed in the study reduced sampling error and selection bias.

5. CONCLUSION

During the course of this study, it was observed that the level of Lassa Fever knowledge among women in Nnewi North LGA was considerably high and they demonstrated good preventive practice. However, there is a need for a proper understanding of LF as this would further improve the healthy attitude of the populace toward lassa fever and people infected or suspected to be infected with the disease. Health workers have a very important role to play in information dissemination to the populace regarding the disease.

6. RECOMMENDATIONS

It is recommended that there be continued sensitization of the populace via electronic and print media on LF and the involvement of Healthcare workers in these sensitization campaigns. More emphasis should be placed on attitude towards the disease, and as a means to clear the skepticism of many regarding vaccination, the role of vaccines in prevention of disease in the past could be includes in the campaigns both to ensure the populace get immunized against current vaccine preventable disease and as a pro-active measure in view of the possibility of a vaccine against LF in the near future.

LFV test should be done on patients that present with febrile symptoms, therefore, there is a need for the government to ensure that healthcare institutions have basic resources for the management of LFV as there are very few hospitals in the country presently equipped to handle LF cases.

ETHICAL APPROVAL AND CONSENT

This research work was done with approval from the Nnamdi Azikiwe University Ethical Committee. Participants were well oriented on the objectives of the study; written consent was obtained prior to administration of the questionnaire which will emphasize the right to non-participation. Data confidentiality was preserved according to the Helsinki declaration of bioethics.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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