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Attitudes Towards Lassa Fever Disease Transmission Among Household Members in Ondo State Southwest Nigeria

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Abstract

Cultural beliefs that contribute to health behaviour patterns among communities and individuals have most times been regarded as obstacles in the control of infectious diseases. Ondo State in southwest Nigeria since 2016 has persistently recorded Lassa fever transmission in 6 Local Government Areas (LGAs) annually, resulting in high case fatality. Hence, identifying and understanding individual and community attitudes and behaviour associated with the continued transmission of Lassa fever in the State could aid the design of appropriate interventions focused on risk communication efforts to reduce the transmission of the disease.

Methods: A descriptive cross-sectional study was conducted among community members in six affected LGAs in May 2018. A semi-structured questionnaire was administered to 2537 consenting respondents to assess their attitudes towards Lassa fever transmission. Data analysis was done using frequency, proportions, Chi-Square test and binary logistic regression of predictors of outcome variable with statistical significance set at $p<0.05$.

Results: The respondents' median age was 41.0 (12-95) years with the highest proportion in the age group above 36 years 1726 (68%). Slightly more than half of the respondents 1283 (50.6%) were females. Respondents agreed (54.2%) and strongly agreed (39.7%) that handwashing can prevent Lassa fever. Also, 47.7% agreed and 35.9% strongly agreed that washing dead bodies can lead to Lassa fever infection. Most of the respondents (98.3%) were positive or optimistic about the disease transmission. On the multivariate logistic regression, the attitude was statistically significantly associated with LGA location and educational level; those in Idanre

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LGA and those with tertiary education had higher odds of positive attitudes compared to those in Owo LGA and those with primary education respectively.

Conclusion: The study found that the overall attitude of community members was positive with little or no misconception, however, the extent to which their attitude influences preventive behavioural practices needs to be investigated to determine the risk communication activities that will have the desired impact in controlling the outbreak.

Keywords: Lassa fever, outbreak, attitude, behaviour, community, Ondo state

Introduction:

Lassa fever is a zoonotic and vector-borne disease transmitted by a "Multimammate rat", Mastomys natalensis.[1] The disease is mainly characterized by fever, muscle aches, sore throat, nausea, vomiting, chest and abdominal pain and hemorrhage from the body's orifices.[2] Primary mode of spread is from rodent to man through contact with the rodent excreta or urine in food or during hunting and processing of rats for consumption or by consumption of food item contaminated with the virus from excreta/urine of these rats.[3] The virus has the capacity for person-to-person spread, either within households during care for sick relatives or in health care settings.[3]

High-risk behaviours and attitudes emanating from societal beliefs among community and households' members have been long associated with the transmission of infectious diseases in West Africa.[4] Cultural norms and values have been found to influence individuals' attitude, behaviour and risk perception towards some infectious diseases especially in West Africa. [4] For instance, medical anthropologists have, however, noted that traditional burial rituals in West Africa which involve physical contact with corpses such as staying and standing with a corpse, washing corpse and the touching corpse as a way of showing respect to the dead during burial are exceptionally high-risk and have been linked to the transmission of several Viral Haemorrhagic Fevers (VHFs) including Lassa fever.[5-6]

Also, many West African communities rely on traditional healing practices involving direct contact between the healer and the patient due to poor knowledge about infection prevention and control and the use of herbal remedies and the same unsterilized materials for several ill persons for the treatment of their ailment.[5,7-8] These cultural beliefs that contribute to health behaviour patterns have most times been regarded as obstacles in the control of infectious diseases.[9-11]

Ondo State in southwest Nigeria over the years has recorded continued transmission of Lassa fever virus causing annual outbreaks with high morbidity and mortality.[12-13] Despite several public health interventions during outbreak response including risk communication on preventive practices and measures towards Lassa fever spread, the outbreak of the disease has persistently occurred in 6 LGAs from 2016 to 2018.[12]

Identifying and understanding individual and community attitudes and behaviour associated with the continued transmission of Lassa fever in Ondo State could aid the design of appropriate

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interventions focused on communication efforts at various levels (individual and community) to reduce the transmission of the disease. This study was conducted to assess household members attitudes towards Lassa fever spread in six LGAs of Ondo state, southwest Nigeria.

Materials and Methods

Study Area and population

Nigeria is the most populous country in Africa, with an estimated population of over 160 million[14] and a growth rate of 3.8% per annum. Nigeria has six regional zones with varying ecologies, climates and population characteristics. The zones are divided into 36 states and the federal capital territory, which is further divided into 774 LGAs or districts and 8 812 administrative wards.[15] Ondo State is one of the 36 states in the Federal Republic of Nigeria situated between longitudes $4^0\,15^1$ E and $6^0\,00^1$E of the Greenwich meridian and latitudes $5^0\,45^1$N and $7^0\,45^1$ N, which are to the North of the equator, in the Southwestern geopolitical zone of the country.[16]

The State has 18 LGAs with three senatorial districts; Ondo North, Central and South and a 2015 projected total population of about 4,489,756 based on the 2006 population census.[16] The climate of the areas is highly favoured for agrarian activities and crops such as cocoa, kola nut, palm tree and arable crops like maize and tubers are grown annually.[17] The annual rainfall is between 1000mm and 1500mm with a high daily temperature of about 30^0C. Most of the population consists of peasant farmers cultivating food and cash crops at a small-scale level. Hunters and livestock keeping is also a major occupation of the population of Ondo State who rear goats, sheep and do some fish farming. Other economic activities in the state include trading and civil service.[18] The outbreak was restricted to six hot spot LGAs (Akure North, Akure South, Akoko Southwest, Ose, Owo and Idanre) in the north and central senatorial districts of the state.

The study was conducted in six affected Lassa fever LGAs in Ondo State (Owo, Ose, Idanre, Akure South, Akure North, Akoko Southwest LGAs). The study population were permanent residents in selected communities within the LGAs of the state.

Sample Size Estimation:

The sample size was determined using the statistical formula for estimating the minimum sample size in descriptive health studies ($n=Z^2pq/d^2$), where Z standard normal deviate corresponding to confidence level at 95%¼ 1.96, d degree of accuracy desire d= 0.05, p=46% (proportion of residents who have a positive attitude about Lassa fever in Osun State, Nigeria)[19] while q=(1-p,1-0.49=0.54); $n= 1.96^2*0.46*0.54/(0.05)=382$. Considering non-responders, we estimated a sample size of 421. Hence, the overall minimum sample size for the six LGA was obtained by multiplying the calculated sample size by 6 (2526 participants).

Study design and data collection:

A descriptive cross-sectional community-based survey was carried out in May 2018. A semi-structured questionnaire was administered to participants by trained research assistants using the Open Data Kit (ODK) application. The questionnaire which captured information on socio-

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demographic variables and attitudes of household members towards Lassa fever transmission was used for assessment.

Sampling Method:
A multistage sampling technique was employed in this study. In stage 1, we selected 5 wards from the list of wards in each Local Government Area (LGA) using a simple random technique (balloting). In stage 2, 5 to 6 settlements out of an average of 30 settlements per ward were sampled by simple random technique (balloting). A total of 30 settlements were randomly selected from the list of settlements generated from each LGA. In stage 3, sampling of households from each selected settlement was done using a systematic sampling technique. Upon arrival at the selected settlement, the total number of households (N) in the settlement was obtained from the head of the community. From the sample size estimation, in each settlement, the research assistants were expected to sample at least 11 households (308/30 settlements). The sampling interval K^{th} was obtained by dividing the total number of households (N) in the settlements by 11. All households were numbered serially and a number between 1 to K^{th} was selected using the table of random numbers to know the first household (Y) to sample. After the first household (Y) was sampled, then Y+ K^{th} was calculated to get the next household to sample until all 11 households were completed. Finally, in stage 4, heads of households or assigned adults older than 18 years in selected households were interviewed.

Data Analysis
The data obtained were analyzed using frequency counts and percentages with SPSS version 16. Overall attitude score was calculated by assigning a value of 1-4 in ranking of the attitude variable from strongly disagree to strongly agree with the average score determined. The total attitude score was 28, the score between 0-13 was considered a negative attitude while 14 -28 was considered a positive attitude. Bivariate chi-square test and multivariate logistic analyses were conducted on respondents' socio-demographic characteristics and attitudes towards Lassa fever transmission. Variables in the bivariate test with a p-value of <0.2 were included in the multivariate model. A p value<0.05 was accepted as significant.

Ethical consideration
The study was conducted as part of an outbreak control investigation hence permission to conduct the study was obtained from the State Ministry of Health (SMoH) and the district primary Health Care Department. Also, Informed consent was obtained from the respondents. They were made to understand that participation is voluntary and there was no consequence for non-participation. All information obtained was kept confidential.

Results
Table 1 shows that the respondents were from Akoko Southwest (16.9%), Akure North (17.5%), Akure South (16.8), Idanre (17.7%), Ose (16.1%), and Owo (14.9%). Slightly more than half of the respondents (50.6%) were female. The median age was 41.0 (12-95) years with the highest proportion in the age group above 36 years 1726 (68%). The majorities 83.0% and 81.7% were

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Christian and of Yoruba extraction respectively. Also, a majority (86.7%) were married, 23.1% had tertiary education and a few were in civil service (12.3%).

Table 1 Socio-Demographic Characteristics of the respondents

Variables	Frequency (N=2537)	Percentage (%)
LGAs		
Akoko South West	429	16.9
Akure North	445	17.5
Akure South	427	16.8
Idanre	450	17.7
Ose	409	16.1
Owo	377	14.9
GENDER		
Female	1283	50.6
Male	1254	49.4
AGE		
<26	210	8.3
26-35	601	23.7
≥36	1726	68.0
RELIGION		
Christianity	2105	83.0
Islam	393	15.5
Other	10	0.4
Traditional	29	1.1
OCCUPATION		
Civil servant	312	12.3
Clergy	99	3.9
Other	1690	77.3
Student	166	6.5
ETHNICITY		
Hausa	28	1.1
Igbo	187	7.4
Other	249	9.8
Yoruba	2073	81.7
MARITAL STATUS		
Divorced	15	0.6
Married	2200	86.7
Single	239	9.4
Widowed	83	3.3
EDUCATIONAL LEVEL		
Primary	930	36.7
Secondary	1018	40.1
Tertiary	589	23.1

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Respondents agreed (46.5%) and strongly agreed (44.0%) that Lassa fever can spread in the community and another 57.5% and 38.1% respectively agreed and strongly agreed that Lassa fever can be prevented, (Table 2). Similarly, (54.2%) of the respondent agreed and 39.7% strongly agreed that handwashing can prevent Lassa fever. About half of the respondents (47.7%) agreed that washing of dead bodies can cause Lassa fever, while 35.9% strongly agreed. About half of the respondents (47.9%) of the respondent agreed and another 46.2% strongly agreed that eating rats can lead to Lassa fever. Moreover, 46.7% and 31.0% of the respondent disagreed and strongly disagreed respectively with the statement that one can care for someone who is suspected of Lassa fever at home. All indicating positive attitudes among the participants towards the disease. On the perception of the seriousness of the disease, 42.5% agreed and 54.2% strongly agreed that Lassa fever is a serious/deadly disease. Overall, almost all the respondents (98.3%) had a positive attitude towards the disease.

Table 2: Attitudes towards Lassa Fever among the respondents (N=2537)

	Strongly Agree	Agree	Disagree	Strongly Disagree
Lassa can spread in the community	44.0	46.5	1.7	7.8
Lassa fever can be prevented	38.1	57.5	0.6	3.8
Handwashing can prevent Lassa fever	39.7	54.2	0.6	5.6
Washing of dead bodies can cause Lassa fever	35.9	47.7	1.5	15.0
Eating a rat can lead to Lassa fever	46.2	47.9	1.0	5.0
You can care for someone who is suspected of Lassa fever at home	7.4	14.8	46.7	31.0
Lassa fever is a serious/deadly disease	2.5	42.5	0.8	54.2

Tables 4 and 5 shows factors associated with attitude towards Lassa fever on the bivariate and logistic regression analysis. Significantly, a higher proportion of respondents located in Idanre LGA (449; 99.8%) had a positive attitude towards Lassa fever compared to the other five LGAs (p= 0.003). More of the males (1239; 98.8%) had higher positive attitude to LF compared to the females (1254; 97.7%) (p= 0.040). Also, a higher proportion (583; 99.0%) of respondents with tertiary level of education had a positive attitude to Lassa fever compared to those with secondary (1007; 98.9%) and primary (903; 97.1%) respectively (p= 0.003). On the multivariate logistic regression, the attitude was statistically significantly associated with the LGA location and educational level of the respondents. Respondents from Idanre LGA had almost 12 times higher odds of having a positive attitude to Lassa fever compared to those in Owo LGA (AOR= 12.3; 95 CI = (1.5-103.3), and those with primary education were 0.3 times less likely to have positive attitudes to Lassa fever compared to those with tertiary level of education (AOR= 0.3; 95% CI= 0.1-1.0)

(Table 5 and 6).

Table 3: Association between Social Demographic and Attitude Towards Lassa Fever among respondents

	ATTITUDE SCORE				
	NEGATIVE	POSITIVE	TOTAL	CHI-SQUARE	P-VALUE
	n(%)	n(%)	n(%)		
LGAs					
Akoko southwest	6(1.4)	423(98.6)	429(100.0)	17.909	0.003
Akure North	17(3.8)	428(96.2)	445(100.0)		
Akure South	7(1.6)	420(98.4)	427(100.0)		
Idanre	1(0.2)	449(99.8)	450(100.0)		
Ose	6(1.5)	403(98.5)	409(100.0)		
Owo	7(1.9)	370(98.1)	377(100.0)		
GENDER					
Female	29(2.3)	1254(97.7)	1283(100.0)	4.214	0.040
Male	15(1.2)	1239(98.8)	1254(100.0)		
AGE					
<26	5(2.4)	205(97.6)	210(100.0)	1.690	0.430
26-35	13(2.2)	588(97.8)	601(100.0)		
≥36	26(1.5)	1700(98.5)	1726(100.0)		
RELIGION					
Christianity	35(1.7)	2070(98.3)	2105(100.0)	4.779	0.189
Islam	7(1.8)	386(98.2)	393(100.0)		
Others	0(0.0)	10(100.0)	10(100.0)		
Traditional	2(6.9)	27(93.1)	29(100.0)		
OCCUPATION					
Civil servant	2(0.6)	310(99.4)	312(100.0)	2.801	0.423
Clergy	2(0.2)	97(98.0)	99(100.0)		
Others	36(1.8)	1924(98.2)	1960(100.0)		
Student	4(2.4)	162(97.6)	166(100.0)		
ETHNICITY					
Hausa	2(7.1)	26(92.9)	28(100.0)	6.094	0.107
Igbo	4(2.1)	183(97.9)	187(100.0)		
Others	6(2.4)	243(97.6)	249(100.0)		
Yoruba	32(1.5)	2041(98.5)	2073(100.0)		
MARITAL STATUS					
Divorced	0(0.0)	15(100.0)	15(100.0)	2.027	0.567
Married	37(1.7)	2163(98.3)	2200(100.0)		
Single	4(1.7)	235(98.3)	239(100.0)		
Widowed	3(3.6)	80(96.4)	83(100.0		
EDUCATIONAL LEVEL					
Primary	27(2.9)	903(97.1)	930(100.0)	11.779	0.003
Secondary	11(1.1)	1007(98.9)	1018(100.0)		
Tertiary	6(1.0)	583(99.0)	583(99.0)		

Table 4: Logistic Regression Analysis of Socio-demographic factors and Attitude of Respondents towards Lassa fever

	ATTITUDE SCORE				
	NEGATIVE	POSITIVE	TOTAL	Adjusted odds ratio (95% Confidence Interval)	p-value
	n(%)	n(%)	n(%)		
LGAs					
Akoko southwest	6(1.4)	423(98.6)	429(100.0)	1.5(0.5-4.8)	0.452
Akure North	17(3.8)	428(96.2)	445(100.0)	0.7(0.3-1.7)	0.413
Akure South	7(1.6)	420(98.4)	427(100.0)	1.1(0.4-3.3)	0.811
Idanre	1(0.2)	449(99.8)	450(100.0)	12.3(1.5-103.3)	0.021
Ose	6(1.5)	403(98.5)	409(100.0)	1.7(0.5-5.2)	0.382
Owo	7(1.9)	370(98.1)	377(100.0)		
GENDER					
Female	29(2.3)	1254(97.7)	1283(100.0)	0.6(0.3-1.2)	0.169
Male	15(1.2)	1239(98.8)	1254(100.0)		
AGE					
<26	5(2.4)	205(97.6)	210(100.0)		
26-35	13(2.2)	588(97.8)	601(100.0)		
≥36	26(1.5)	1700(98.5)	1726(100.0)		
RELIGION					
Christianity	35(1.7)	2070(98.3)	2105(100.0)	4.1(0.9-19.4)	0.075
Islam	7(1.8)	386(98.2)	393(100.0)	4.7(0.8-26.0)	0.080
Traditional	0(0.0)	10(100.0)	10(100.0)	72665324(0.0-0.0)	0.999
Others	2(6.9)	27(93.1)	29(100.0)		
OCCUPATION					
Civil servant	2(0.6)	310(99.4)	312(100.0)	3.2(0.4-27.2)	0.289
Clergy	2(0.2)	97(98.0)	99(100.0)	1.3(0.1-11.0)	0.820
Others	36(1.8)	1924(98.2)	1960(100.0)	2.0(0.4-10.9)	0.424
Student	4(2.4)	162(97.6)	166(100.0)		
ETHNICITY					
Hausa	2(7.1)	26(92.9)	28(100.0)	0.3(0.1-1.5)	0.140
Igbo	4(2.1)	183(97.9)	187(100.0)	0.6(0.2-1.9)	0.398
Others	6(2.4)	243(97.6)	249(100.0)	0.9(0.3-2.2)	0.753
Yoruba	32(1.5)	2041(98.5)	2073(100.0)		
MARITAL STATUS					
Divorced	0(0.0)	15(100.0)	15(100.0)	28469710.9(0.0-0.0)	0.999
Married	37(1.7)	2163(98.3)	2200(100.0)	1.6(0.4-5.5)	0.494
Single	4(1.7)	235(98.3)	239(100.0)	2.7(0.3-22.0)	0.344
Widowed	3(3.6)	80(96.4)	83(100.0		
EDUCATIONAL LEVEL					
Primary	27(2.9)	903(97.1)	930(100.0)	0.3 (0.1-1.0)	0.042
Secondary	11(1.1)	1007(98.9)	1018(100.0)	1.0 (0.3-3.0)	0.983
Tertiary	6(1.0)	583(99.0)	583(99.0)		

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Discussion

This study, a part of the assessment of the knowledge, attitude and practices of community members towards Lassa fever, focused on the attitudes of household heads in Ondo State towards the disease. The primary transmission was observed to be the main mode of transmission of the disease in a recent outbreak in the State[12], hence the attitudes of household members who are the first contact in the animal-man transmission interface in endemic areas is important in predicting behaviours with regards to complying with measures that could mitigate transmission of the disease.

The majority of the respondents agreed and strongly agreed that Lassa fever could spread in the community and can be prevented. This finding is consistent with the current knowledge of the transmission of Lassa fever.[12,20-21]. Humans usually become infected with the Lassa virus from exposure to urine or feces of infected Mastomys rats. In addition, person-to-person transmission occurs in both communities and in healthcare settings, where the virus could be spread. Primary transmission of the Lassa virus from its host to humans can be prevented by avoiding contact with the rodents especially in areas where outbreaks occur. Putting food away in rodent-proof containers and keeping the home clean could help to discourage rodents from entering a home, However, these practices are hardly observed in communities, as shown in the study that foodstuffs are still spread in open spaces.[22] The gap in attitude and practice of community members towards prevention of Lassa fever may be so because the containers are not easily available in rural areas and no alternatives of sun drying of foodstuffs are provided or affordable by community members.

Also, slightly more than half agreed and close to half strongly agreed that handwashing can prevent the disease. Regular handwashing with soap and water is known to be the simplest and most cost-effective method of preventing the most common infections that cause mortality, including Lassa fever. [12, 20-22] Several initiatives have been carried out to promote the adoption of regular hand washing by the government and partners. However, the availability of materials including water and sometimes cultural practices have been identified as barriers to its adoption in endemic communities.[22] In a cluster randomized controlled trial that included pupil focus groups and explored factors that may influence handwashing behaviours among pupils and staff in primary schools; lack of time, poor adult modelling of regular hand washing, and unattractive facilities were seen as important barriers to regular hand washing.[20]

On the statements with regards to if washing of dead bodies and eating of rats could lead to the disease, a majority agreed and strongly agreed. Our findings contrast the gap in knowledge regarding burial practices in a study.[21] This has important implications for the spread of the disease in communities. It was reported that families have got themselves infected unknown to them through the conduct of traditional rites, such as washing or touching the body of a deceased Lassa fever patient.[21] Standard burial practice involves decontamination of the body using 1:10 bleach solution and placement in a body bag, which is similarly decontaminated and placed in a coffin where this is available and culturally appropriate. Also, Lassa fever is known to spread through the activities of rats in endemic communities.[12] A report on the prevention of Lassa

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fever in Nigeria, identified possible sources of Lassa fever infection in their study to include the use of rat meat as a source of protein.[22] The natural hosts for Lassa fever virus, multimammate rats (*Mastomysnatalensis*), are probably the most common rodent in tropical Africa and are found predominantly in rural areas, and in dwellings more often than in the surrounding countryside.[2,23] One study found that Lassa fever virus antibodies occur after a febrile illness in twice as many people who eat rats as in those who do not.[24]

Caring for someone who is suspected of Lassa fever at home was not perceived as right as the majority disagreed and strongly disagreed. Similarly, Lassa fever was perceived as a serious and deadly disease by a majority who strongly agreed and agreed. These findings also have important implications in the control of the infection. And may have been the consequence of the sensitizations carried out in the State. With these expressed attitudes, we expect cases to be reported to the hospital and preventive measures to be taken seriously. Our findings, however, contrast with a study which found that with regards to attitudes of the respondents towards people suspected to be infected with Lassa fever, 41% of the respondents would show some discriminatory attitudes towards such individuals whereas 35.5% will keep the information secret if a family member is suspected to be infected with the disease.[25] However, in the same study, 71% agreed that individuals diagnosed with Lassa fever must be admitted. Lassa fever is treated with ribavirin. Rare cases have been reported in which patients recovered without drug treatment.[26] Nevertheless, the overall case fatality is high if treatment is not undertaken timely.[12] Overall, 98.2% of respondents could be considered to have a positive attitude towards the disease. The positive attitude was independently significantly higher in one of the LGAs, Idanre LGA compared to Owo and among those who had tertiary education. The positive attitudes we report in this study contradict those reported in other studies.[19,27] For instance, a study reported that more than half of their respondents had a negative attitude.[19] Also, most studies did not assess or discuss attitude even when the objective or title indicated that.[27] Our respondents appear to have been well sensitized before the survey, hence the finding of a positive attitude. The higher positive attitude among those with tertiary education may be related to knowledge. However, the reason for the higher significant positive attitude in one location will require further investigation as we could not deduce any obvious reason why this was so.

Finally, we recognized the limitations that the timing and design of the study could have imposed on our findings. The survey was done towards the end of an outbreak when sensitizations were going on; the awareness created can influence knowledge as well as the attitude of our participants. However, the study provides a quantitative measure of the level of attitude which was achieved and can serve as a basis or justification for further action on risk communication. In addition, social desirability and recall bias could also have influenced responses from participants.

Conclusion:

The study found that the overall attitude of community members was positive with little or no misconception, however, the extent to which their attitude influences preventive behavioural practices needs to be investigated in order to determine the risk communication activities that will have the desired impact in controlling the outbreak.

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