

ORIGINAL RESEARCH ARTICLE

Combating Lassa fever for sustainable development: Interplay of perceived behavioural control and current preventive practices in most endemic States in Nigeria

DOI: 10.29063/ajrh2021/v25i5s.12

Charity A. Ben-Enukora¹, Olusola S. Oyero², Keyinde O. Oyesomi¹ and Babatunde K. Adeyeye¹

Department of Mass Communication, Covenant University Ota, Nigeria^{1,3,4}; Department of Mass Communication, Anchor University Lagos, Nigeria²

*For Correspondence: Email: enukora.ben@stu.cu.edu.ng; benenukoracharity@gmail.com; Phone: +2348068862939

Abstract

Lassa fever has become a recurring incidence in Nigeria with high case fatality rates recorded in recent times. Given that total compliance with standard hygiene is recommended as a fundamental ingredient for the prevention of Lassa fever, this study investigated the influence of perceived behavioural control and current household and environmental hygiene practices for Lassa fever prevention among residents of selected Lassa fever endemic states in Nigeria. Data collected from primary sources through a mixed-methods approach, using self-administered structured questionnaire and Focus Group Discussions (FGDs) was used for analysis and drawing of inferences. The sample size consisted of 663 survey respondents and 72 FGD participants. The quantitative data was analysed with the aid of SPSS version 23 using descriptive and inferential statistics while thematic analysis was employed in analysing the qualitative data. The findings indicate that the residents perceived certain recommended hygiene practices as 'easy-to-perform' while some are perceived as 'difficult-to-perform'. Compliance with standard hygiene practices is still partial due to the significant influence of Perceived Behavioural Control on current practices towards Lassa fever prevention in all the selected states at ($R^2 = .023, .040$ and $.111$ for Ebonyi, Edo and Ondo states respectively, at $p < 0.05$). The study recommends the establishment of community-based mechanized food/crops drying facilities at subsidized rates to remove the risk of food contamination by rodents during sun-drying and extensive use of interpersonal communication channels for door-to-door campaign for the total compliance with the preferred hygiene practices for Lassa fever. (*Afr J Reprod Health 2021; 25[5s]: 126-137*).

Keywords: Disease prevention, hygiene practices, lassa fever, perceived behavioural control, sustainable development

Résumé

La fièvre de Lassa est devenue une incidence récurrente au Nigeria avec des taux de létalité élevés enregistrés ces derniers temps. Étant donné que le respect total des normes d'hygiène est recommandé comme ingrédient fondamental pour la prévention de la fièvre de Lassa, cette étude a examiné l'influence du contrôle comportemental perçu et des pratiques actuelles d'hygiène domestique et environnementale pour la prévention de la fièvre de Lassa chez les résidents de certains États endémiques de la fièvre de Lassa au Nigeria. Les données recueillies auprès de sources primaires par le biais d'une approche à méthodes mixtes, à l'aide d'un questionnaire structuré auto-administré et de discussions de groupe de discussion (FGD) ont été utilisées pour l'analyse et l'élaboration d'inférences. La taille de l'échantillon se composait de 663 répondants à l'enquête et de 72 participants aux groupes de discussion. Les données quantitatives ont été analysées à l'aide de SPSS version 23 en utilisant des statistiques descriptives et inférentielles tandis que l'analyse thématique a été utilisée pour analyser les données qualitatives. Les résultats indiquent que les résidents percevaient certaines pratiques d'hygiène recommandées comme « faciles à mettre en œuvre » alors que certaines sont perçues comme « difficiles à mettre en œuvre ». Le respect des pratiques d'hygiène standard est encore partiel en raison de l'influence significative du contrôle comportemental perçu sur les pratiques actuelles de prévention de la fièvre de Lassa dans tous les États sélectionnés à ($R^2 = 0,023, 0,040$ et $0,111$ pour les États d'Ebonyi, Edo et Ondo respectivement, à $p < 0,05$). L'étude recommande la mise en place d'installations de séchage des aliments/récoltes mécanisées à base communautaire à des tarifs subventionnés pour éliminer le risque de contamination des aliments par les rongeurs pendant le séchage au soleil et l'utilisation intensive de canaux de communication interpersonnels pour la campagne de porte-à-porte pour le respect total des les pratiques d'hygiène préférées pour la fièvre de Lassa. (*Afr J Reprod Health 2021; 25[5s]: 126-137*).

Mots-clés: Prévention des maladies, pratiques d'hygiène, fièvre de lassa, contrôle comportemental perçu, développement durable

Introduction

No doubt, sustainable development is not possible without a healthy population. Therefore, the prevention of Lassa fever is imperative for actualizing of the Sustainable Development Goal 3 which focuses on “ensuring healthy lives and the promotion of wellbeing for all at all ages”. Specifically, the SDG 3 Target no 3 aims to end Neglected Tropical Diseases (NTDs) including other communicable diseases by 2030¹. Thus, it aims at making the world safe from epidemic and pandemic threats². Lassa fever is one of the known NTDs of public health significance. Lassa fever is prevalent among the known viral haemorrhagic fevers in the West African sub-region with an estimated 100, 000 to 300, 000 recorded cases of Lassa fever infection per annum, resulting into about 5,000 deaths annually³. Accordingly, the World Health Organisation (WHO) has listed the disease among priority disease demanding urgent action in terms of vaccine development, as well as its prevention and control³.

Empirical evidence has also shown that Lassa fever is endemic in Nigeria, especially in geographical areas with a relatively large number of Lassa virus seropositive rodents⁴⁻⁶. Beside the abundance of the Lassa virus vector in these areas, negligence of household and environmental hygiene practices contribute to the disease reoccurrence since the rodents vector thrive in dirty and overcrowded environments; open waste dumps, dirty drainages, food stuff stores, slums, and rural dwellings with poor housing facilities⁷⁻⁹.

While the direct transmission of the Lassa virus from its rodent hosts to humans occur through close contact with infected rodents during hunting, handling, butchering, and consumption of rodents as bush meat, rodent bite or contact with cuts, sores or bruised human skin^{3, 10-11}; indirect routes of Lassa fever infections are linked to exposed food items, consumption of uncooked, poorly cooked, and inadequately reheated foods which could easily be contaminated by rodents' excreta as they scavenge on human food remains or poorly stored food¹²⁻¹³. Remarkably, about 80% to 90 % of human populations infected by Lassa fever contract the virus through primary transmission routes via indirect contact with the rodent vector³. Thus, transmission through this route is very common.

Combating Lassa fever for sustainable development

Additionally, studies have found that socio-cultural practices that promote human contact with rodents also determine to a large extent the transmission and persistence of Lassa fever infections in the region¹⁴⁻¹⁵. These socio-cultural practices include sun-drying of foodstuffs and farm products such as grains on the roadsides, rodent consumption, as well as consumption of food contaminated with excretions and secretions (urine and faeces) of rats. Put succinctly, poor practices relating to household and environmental hygiene including waste disposal, environmental sanitation, food storage and housekeeping have been identified as predisposing factors that encourage the spread of Lassa fever particularly in endemic areas.

Thus, communities where the compliance with the predisposing environmental, personal and household hygiene practices are poor tend to experience increased rodent infestation and become vulnerable to Lassa fever infections. Therefore, breaking the chain of Lassa fever transmission through this route by total compliance with standard household and environmental hygiene practices is a necessary step that will aid in the prevention of Lassa fever.

Regrettably, wide-spread neglect to environmental sanitation in Nigeria calls for concern. Some authors believe that strict adherence to environmental sanitation and house-to-house environmental inspection as well as enforcement of environmental sanitation laws is a necessary mechanism that will aid in the attainment of a clean and desirable environment¹⁶. The authors maintain that coercion is required since actions and inactions of one individual could trigger the spread of Lassa fever and its attendant consequences to communities and the nation at large. Although some authors have maintained that environmental education would help to create environmental consciousness among informed citizens.

Notably, it has been observed that only 23.3% of the respondents among the residents of rural communities in the Lassa fever-endemic area of Edo state agreed that environmental and personal hygiene plays a significant role in the control of Lassa fever¹⁷. In a related study, conducted in Ijebu-Owo, a Lassa fever-endemic area in Ondo state, it was reported that rodent consumption was quite common among residents and the avoidance of its consumption was least mentioned as a method

of prevention¹⁸. More so, knowledge of Lassa fever and perception towards rodent control in relation to Lassa fever prevention among urban slum dwellers in Nigeria was found to be generally low⁹⁻²⁰. Previous studies have also shown that students' practices of Lassa fever prevention were generally poor^{14, 21-22}. Removing the contaminated portions of foodstuff or snacks eaten by rats but consuming the remaining part was among the high risk practices reported among the students²³. Moreover, poor practices relating to housekeeping, sanitation, and waste handling were prevalent irrespective of high perceptions of environmental risk factors that stimulate Lassa fever infection²². However, previous studies reported that the majority of foodstuff traders' adopted rat control measures such as the use of chemicals and covering of holes in addition to safe food handling practices such as storage of food in sacks and covered bowls to prevent rodent's attack even though their knowledge of Lassa fever was inadequate²³⁻²⁴.

Available evidence shows that risk communication interventions for Lassa fever are targeted at the public through various channels of communication especially radio jingles with the aim of influencing knowledge, attitude and behaviour on household and environmental hygiene practices towards the disease prevention and control. However, the perceived ease or difficulty in carrying out the recommended preventive practices for Lassa fever prevention and its influence on the current household and environmental hygiene practices in the identified Lassa fever endemic states is yet to be established. This study aims to fill this gap in knowledge. Therefore, the study aimed at determining the perceived ease or difficulty in adhering to the recommended practices for Lassa fever prevention and the current preventive practices among residents in the most endemic states. Hypothesis testing was designed to indicate the extent to which Perceived Behavioural Control influences the respondents' current hygiene practices towards Lassa fever prevention in Ebonyi, Edo and Ondo states.

Theoretical framework

The Theory of Planned Behaviour (TPB) provides the framework for this study. TPB as propounded by Ajzen²⁵ emerged as an expansion of the Theory

of Reasoned Action by including the construct perceived behavioural control to deal with situations where the individual does not have complete volitional control. Perceived behavioural control focuses on the extent to which people believe that they are capable of performing a given behaviour²⁶. The proponent posits that the success in performance of a social behaviour depends on the degree of a person's control of internal and external factors that may interfere with the execution of the intended behaviours²⁷. Thus, it has a direct link to behaviour. Perceived Behavioural Control are in two dimensions; individual perception of having adequate control and management of resources that facilitate the successful performance of a particular behaviour and the perceived level of ease or difficulty associated with doing the behaviour²⁸. The degree of ease or difficulty depends on internal factors such as skills, abilities and external factors such as time and dependence on others. Thus, if an individual perceives that certain behaviour poses too much difficulty to perform, there is an increased likelihood that his or her perceived behavioural control will be poor and if an individual possesses more resources and opportunities, his or her perceived control over the behaviour would be greater²⁹⁻³⁰.

Methods

This study employed mixed methods approach, using both qualitative and quantitative technique via a cross-sectional research design. A pretested structured questionnaire was used as instrument for survey whereas a self-designed open-ended interview-guide was used to facilitate various sessions of the Focus Group Discussion. The qualitative data was obtained through tape-recording, note-taking and participant observation, and the transcribed texts were used for data analysis. Three states -Edo, Ebonyi and Ondo (from South-South, South-East and South-West regions respectively) were selected for this study due to high prevalence rate of confirmed cases of Lassa fever in recent times³¹⁻³⁴.

Multi-stage sampling technique was employed in selecting the clusters from which the samples were drawn. Simple random sampling was employed to select the survey respondents amongst eligible household members while the FGD participants were purposively selected via an

invitation issued through local community leaders and social groups soliciting the attention of people who are exposed to Lassa fever risk communication interventions and who were interested in participating in the study.

The study population comprised of all residents both literate and semi-literate aged 18 years and above who are exposed to Lassa fever risk communication interventions. The sample size (663 respondents) for the survey study was arrived at using the sample size determination table by Krejcie and Morgan³⁵ and Research Advisor³⁶ which stipulates that the sample size of 663 is statistically acceptable for a population of over 1,000,000 residents but only 653 copies of the questionnaire properly filled were used for analysis. For the qualitative study, 90 persons indicated interest to participate in the FGD. The sample size of 72 participants (80%) was randomly selected from those who indicated interested to ensure that each person is given an equal opportunity to participate. Then, three focus group sessions (one session per senatorial district) comprising of eight participants (4 male and four female each) were held per state.

Therefore, 24 residents participated in the FGD per state, making a total of 72 selected participants for the three states. The quantitative data was analysed with the aid of SPSS version 23 using descriptive and inferential statistics while thematic analysis was employed in the analysis of the qualitative data.

Ethical approval for this study was obtained from the Covenant University Research and Ethics Committee (Ref. number CHREC/107/2019) and the respondents voluntarily participated in the study. All selected participants were educated about their rights before they granted consent by filling and signing the informed consent form. Personal identifiers were removed by assigning numbers to each participant to guarantee the confidentiality of information obtained.

Results

The survey and Focus group responses to each research question are presented and analysed according to individual states.

Perceived behavioural control

Respondents were asked to indicate the perceptions regarding the ease or difficulty in practicing the

Combating Lassa fever for sustainable development

recommended Lassa fever preventive measures. The quantitative results measured with five points Likert's scale are presented in Table 1. Table 1 shows that 80% of the respondents perceive that the storage of food items in tight containers to avoid rats' attack is not a difficult task. The results indicate that most respondents across the selected states expressed similar opinions. The table also demonstrates that more than half of the respondents think that the cost or difficulty of refuse disposal far away from homes/offices/shops is a major challenge in maintaining a clean environment and most respondents across the selected states expressed similar opinions. Table 1 also illustrates that over 80% of the respondents agreed that they can afford rat poison/traps and the necessary skills to kill rats. Also, the data across the selected states show that most respondents expressed similar opinion.

Furthermore, the results show that over 80% of the respondents agreed think that maintaining a clean environment devoid of rats requires hard work. Specifically, the results indicate that most respondents in Ebonyi and Edo states indicated that they strongly disagreed while most respondents from Ondo strongly agreed to the statement.

Similarly, the results indicate that most respondents across the selected states expressed similar opinion. The results indicate that more than 60% of the respondents think they cannot afford alternative ways of drying farm produces and other food items, except sun-drying in open space outside homes.

Focus group responses regarding the perceived ease or difficulty in practicing the recommended Lassa fever preventive measures

The Focus Group results revealed divergent views about ease and difficulty in the performance of the expected behaviours for Lassa fever prevention across various sessions. The emerging themes from the discussion 'sessions' were "easy-to-perform" and "difficult-to-perform" recommended practices. Excerpts from various discussion sessions include;

For me, I have been trying my best to do everything I know that can prevent Lassa fever, particularly keeping my environment clean and blocking all rat holes but one cannot rule out

Table 1: Percentage distribution of respondents' opinions about the ease or difficulty (perceived behavioural control) in practicing the recommended Lassa fever preventive behaviours

	States			Overall number/%
	Ebonyi	Edo	Ondo	
Storing food items in tight containers to avoid rats' attack is not a difficult task				
Strongly Agree	25.5	39.8	61	(292)44.7
Agree	35.9	49.2	31.1	(255)39.1
Undecided	19.0	5.7	5.1	(56)8.6
Strongly Disagree	6.5	2	0.8	(17)2.6
Disagree	13.1	3.3	2.	(33)5.1
Total	100%	100%	100%	(653)100%
I think the cost or difficulty of throwing away refuse far away from home/office/shop is my major challenge in maintaining a clean environment				
Strongly Agree	40.5	36.6	34.3	(239)36.6
Agree	33.3	19.1	30.7	(176)27.0
Undecided	13.7	15.9	11	(88)13.5
Strongly Disagree	7.2	17.1	20.5	(105)16.1
Disagree	5.2	11.4	3.5	(45)6.9
Total	100%	100%	100%	(653)100%
I think I have the money to buy rat poison/ traps and the necessary skills to kill rats				
Strongly Agree	19.6	28.9	15.4	(140)21.4
Agree	60.8	54.5	67.7	(399)61.1
Undecided	9.8	4.9	10.2	(53)8.1
Strongly Disagree	5.9	6.5	4.7	(37)5.7
Disagree	3.9	5.3	2	(24)3.7
Total	100%	100%	100%	(653)100%
Maintaining a clean environment with no rats does not require hard work				
Strongly Agree	15.7	24	38.6	(181)27.7
Agree	20.3	19.9	13	(113)17.3
Undecided	15.7	4.9	4.3	(47)7.2
Strongly Disagree	25.5	32.1	34.6	(206)31.5
Disagree	22.9	19.1	9.4	(106)16.2
Total	100%	100%	100%	(653)100%
I do not think I can afford alternative ways of drying my farm produces except sun-drying in open space outside my house				
Strongly Agree	32.7	46.7	11.4	(194)29.7
Agree	46.4	36.2	31.9	(241)36.9
Undecided	13.1	9.3	32.7	(126)19.3
Strongly Disagree	5.2	4.5	13	(58)8.0
Disagree	2.6	3.3	11	(40)6.1
Total	100%	100%	100%	(653)100%

the presence of rats even in a clean environment (Female: 42; Ondo state).

Observing regular hand washing, storing of foods in rodents-proof containers, keeping garbage far away from home and keeping pets like cats are very easy to achieve but avoiding contact with blood and other bodily fluids when caring for sick relatives is difficult (Male; 43; Ebonyi).

I can protect my home and environment from rats by clearing bushes and blocking every opening in my house so that rats will not come inside and always keep my environment clean.

However, I can't stop drying food items outside my house (Female; 37; Ebonyi).

Some of these things are easier said than done. The preventive measures may seem easy when it is said but we face some challenges in doing them. For instance, rats are not easy to eliminate. You keep killing them, they keep coming. They live in the gutters and how many of us make out time to clean the gutters around our houses. Another thing is avoiding body contact with sick persons. What if the sick person is your wife or children? It may not be easy to avoid contact with your family members when they are sick (Male; 38; Ebonyi).

Ben-Enukora et al.

Keeping the environment clean, killing rats, storing food in containers are easy to achieve but the bushes around are always a challenge because we can't control other people to keep their environments clean. Even, when you try talking to your neighbours to clear the bushes within their own property, some people pick offence and oftentimes rats use those bushes as hiding place and scavenge on our own premises too (Female; 45; Edo).

Most female participants from urban communities identified waste disposal as a major challenge militating against the elimination of rats in the environments and maintenance of a clean environment. Some participants said,

Waste disposal far away from home is often not possible due to failure of PSP to come on time. So, we normally pack the wastes inside sacks and put them outside, in front of the house so that when they come around anyone that is at home can throw them into the truck. But sometimes, the sacks would stay there for up to three weeks before they come (Female; 42; Ondo).

Waste disposal agencies do not visit regularly and sometimes rats gain entry into homes even when the environment is clean (Female; 37; Edo)

Inadequate provision of waste disposal basins is a major challenge towards the maintenance of clean environment and rats' eradication in homes. Whereby there is no public waste basin in the area where someone is living, people will have no option than to dump their refuse on the roads, nearby bushes, and even in drainages (Female; 40; Ondo).

Disposing of refuse very far from home is a big challenge for us in the town. Many people pack refuse in buckets and bags at the balconies, in their kitchens and outside in the compound for some time before they make out time to throw them away. I am sure you will see for yourself if you enter people's homes (Female; 37; Ebonyi).

Opinions from rural participants revealed that most respondents would continue to indulge in the habit of sun-drying of food produce outside their houses

Combating Lassa fever for sustainable development

even when such practice has been exposed as a risk factor for Lassa fever infection as rodents often defecate on the food produce in the bid to pilfer from the food items. A male participant said,

Definitely, I will continue to sun-dry my food produce outside my house because there is no alternative method.

Even when the moderator mentioned drying machines as alternative, He retorted;

I hope it does not require electricity. If it does, then there is no alternative to sun-drying (Male; 47; Edo).

Other comments include;

I will continue to sun-dry my food items outside because I don't have alternative way of drying them but I used to put it on top of table or chair not on the ground (Female; 34; Ebonyi).

We can only preserve food items after drying them in the Sun. So, I will not stop it because it even makes it easier for proper storage of food (Male; 35; Edo).

I will continue to dry my food items in the sun outside my house because rodents hardly move around during the day (Female; 40; Ondo).

I think telling people to stop sun-drying food items outside their homes is not the right thing. For me, I dry my things in the sun outside but I monitor them to make sure that rodents don't scavenge of them and I also pack them in a polybag or sac once it is sunset. But some people will leave their food items outside for days and that's a bad thing (Male; 38; Ebonyi).

Current practice for Lassa fever prevention

To determine the rate of compliance with the recommended practices for Lassa fever prevention in the selected states, the respondents' current practices were evaluated using specific items on hygiene practices. Table 2 shows the quantitative results of the respondents' current practices towards Lassa fever prevention. The results in table 2 demonstrates that more than a half of the respondents do not always dispose of their refuse far away from their surroundings to prevent rats from entering their home/office/shop.

Table 2: Percentage distribution of respondents current practices towards Lassa fever prevention

	States			Overall number/ %
	Ebonyi	Edo	Ondo	
I throw away my refuse far away from my surrounding to prevent rats from entering my home/office/shop				
Strongly Agree	30.7	28.9	36.6	(211)32.3
Agree	10.5	11.4	4.3	(55)8.4
Undecided	19	22	11	(111)17.0
Strongly Disagree	35.3	32.1	47.6	(254)38.9
Disagree	4.6	5.7	0.4	(22)3.4
Total	100%	100%	100%	(653)100%
I always cover my food items so that rats will not eat them				
Strongly Agree	49	32.5	65.4	(321)49.2
Agree	43.8	59.8	29.9	(290)44.4
Undecided	2.6	3.7	0	(13)2.0
Strongly Disagree	3.3	2	4.7	(22)3.4
Disagree	1.3	2	0	(7)1.1
Total	100%	100%	100%	(653)100%
I always keep my environment clean and also kill rats once I see any				
Strongly Agree	37.9	30.5	46.5	(251)38.4
Agree	44.4	50	44.1	(303)46.4
Undecided	9.8	11	0.4	(43)6.6
Strongly Disagree	5.2	3.7	9.1	(40)6.1
Disagree	2.6	4.9	0	(16)2.5
Total	100%	100%	100%	(653)100%
I always throw away all foods/snacks suspected to have been eaten by rat				
Strongly Agree	37.9	26.8	58.7	(272)41.8
Agree	11.8	12.6	7.5	(64)10.4
Undecided	9.8	5.7	7.9	(49)7.5
Strongly Disagree	27.5	38.6	21.7	(192)29.4
Disagree	13.1	16.3	4.3	(71)10.9
Total	100%	100%	100%	(653)100%

Table 3a: Regression model summary illustrating influence of perceived behavioural control on current practices towards Lassa fever prevention

Model Summary ^a					
States	Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
Ebonyi	1	.125 ^b	.023	.019	.863
Edo	1	.200 ^b	.040	.036	.715
Ondo	1	.334 ^b	.111	.108	.855

a. Predictors: (Constant), Perceived_Behavioural_Control
b. Preventive Practices

Table 3b: Regression ANOVA Model illustrating influence of perceived behavioural control on current practices towards Lassa fever prevention

States	Model	Sum of Squares	Df	Mean Square	F	Sig.
Ebonyi	1 Regression	1.796	1	1.796	8.411	.003
	Residual	112.530	151	.745		
	Total	114.327	152			
Edo	1 Regression	5.216	1	5.216	10.213	.002
	Residual	124.621	244	.511		
	Total	129.837	245			
Ondo	1 Regression	23.090	1	23.090	31.560	.000
	Residual	184.374	252	.732		
	Total	207.465	253			

a. Predictors: (Constant), Perceived_Behavioural_Control
b. Dependent Variable: Preventive Practices

Table 3c: Regression coefficients illustrating influence of Perceived behavioural control on current practices towards Lassa fever prevention

States	Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.	
		B	Std. Error	Beta			
Ebonyi	1	(Constant)	3.564	.504		7.067	.000
		PerceivedBehaviouralControl	.223	.144	.175	1.553	.003
Edo	1	(Constant)	3.263	.298		10.961	.000
		PerceivedBehaviouralControl	.260	.081	.200	3.196	.002
Ondo	1	(Constant)	2.243	.407		5.506	.000
		PerceivedBehaviouralControl	.590	.105	.334	5.618	.000

a. Predictors: (Constant), PerceivedBehaviouralControl
b. Dependent Variable: Preventive Practices

The results indicate that most respondents across the selected states expressed similar opinion. More than three-quarter of the respondents asserted that they always cover their food items to prevent rats from eating or contaminating them with excreta. Likewise, more than three-quarter of the respondents stated that they always keep their environment clean and also kill rats once they see any, this opinion was expressed by most respondents across the selected states.

Furthermore, the results indicate that only half of the respondents uphold that they always throw away all foods/snacks suspected to have been eaten by rat while the remaining half would likely cut-out the portions suspected to have been eaten by rats and eat the remaining.

Focus group responses on current hygiene practices towards Lassa fever prevention

The prominently mentioned preventive behaviours described by respondents across all focus groups include; covering of food items in rodents-proof containers like buckets with cover, sacs and poly bags; killing of rats at homes with traps, rat poison and keeping of cats at homes to prey on rats, blocking of rat holes and keeping the environment clean. Additional preventive measures practiced in the study areas are; avoidance of skin-to-skin contact with suspected infected person and avoiding contact with other persons' bodily fluids. Most participants reported that they have started practicing these behaviours since they became aware of Lassa fever and its preventive measures. Excerpts from participants' views include;

Since wey I hear about Lassa fever, I dey make sure say we dey cover our foods both the one wey we never cook and even the one wey we

chop remain for house or I put am inside bucket or pot wey get cover so that rat no get fit chop am. If I buy amala, I go put am for bucket wey get cover. I dey use polythene bag pack my dirty. Na so I dey do make we for no get Lassa (Female; 58; Ondo).

I make sure that my house is clean. I use bucket that has cover to pack my household wastes and if the waste management people did not come on time, I used to carry the dustbin in my car to throw it away in the bush while going to work (Female; 34; Ebonyi).

The thing wey I dey do na killing of rats. I dey block rat hole if I notice am. But I still dey drink garri ooo. I go try to stop that one (Male; 25; Edo).

The only thing I do is killing of rats and cutting of bushes but cleaning of the house is my wife's responsibility and she has been doing that very well (Male; 42; Ondo).

The moderator further pried on respondents' practice regarding foods nibbled by rats. While fewer respondents stated that they throw away the entire food, majority of the respondents stated otherwise. Some of the responses include;

I dey cover my food too but I no dey throw away all my food sake of say rat don play on top. I go just pack that portion throw away. Make I talk true. Na God deysave im people (Female; 42; Edo).

If it is something like snacks I can throw everything away but if its yam, or any other food, I will just cut off the part that rat has eaten and keep the remaining one because I

Ben-Enukora et al.

may not have the money to buy another one, if I throw everything away
(Female; 32 Ebonyi).

Aaah! If we should throw away everything eaten by rats, then nothing will remain in my house because rats are always in my house. It is not easy for someone to throw away an entire food away like that (Male; 33; Ondo).

Hypothesis result

Regression analysis was used to determine the influence of perceived behavioural control on current practices towards Lassa fever prevention. Decision was reached at significance level below 0.05. Table 3c shows that the variance in perceived behavioural control can only be explained by the variance in preventive practices of residents respectively. R square which is a coefficient of determination for Ebonyi, Edo, and Ondowere .023, .040 and .111 respectively. The implication of this variance is that an increase in perceived behavioural control results in a unit increase in the current preventive practices among the respondents in the selected states. The standard error of the estimate shows .863, .715 and .855 for Ebonyi, Edo, and Ondorespectively.

The ANOVA table depicts 0.003, 0.002 and 0.000 significance levels for Ebonyi, Edo, and Ondostates respectively. These results suggest that perceived behavioural control has significant influence on preventive practices across residents of the three selected states. Therefore, perceived behavioural control is a significant predictor of current practices in all the selected states. This implies that residents would likely adopt the “easy-to-perform” recommended practices leaving out those that they perceive as problematic.

The coefficient table shows that the p-values for Ebonyi, Edo, and Ondostates were below 0.05. This indicates a statistical confidence of above 95%. This suggests that the perceived ease or difficulty in performing the recommended preventive behaviours for Lassa fever has a significant influence on the respondents’ current practices towards Lassa fever prevention in Ebonyi, Edo and Ondo states. Therefore, the null hypothesis was rejected for the three selected states.

Discussion

The study established a high level of perceived behavioural control on the storage of food items in

Combating Lassa fever for sustainable development

tight containers to avoid rats’ attack, affordability of rat poison/traps and the necessary skills to kill rats as well as the maintenance of a clean environment. This implies that there is the likelihood of residents’ carrying out such behaviours to get rid of rats in their environment. However, the cost or difficulty of refuse disposal far away from home/office/shop was perceived to be a major challenge in maintaining a clean environment in all the selected states. Also, the result indicates that a good number of residents would probably not maintain a clean environment since they think it is not achievable without some stress. Moreover, most respondents perceive that they cannot afford alternative ways of drying food item apart from sun-drying of food items outside homes. The implication of the result is that most residents would continue to indulge in sun-drying of food items particularly farm produce in open places outside their homes. The persistence in this act in endemic areas implies that transmissions of Lassa virus via this route will linger.

The study also found that respondents have not completely adopted all the recommended household and environmental hygiene practices for Lassa fever prevention in the selected states. Most respondents expressed that they cover their food items in containers with lids, block rat holes and keep their environment clean. This finding corroborates earlier reports that majority of the sampled respondents adopted rat control measures^{22,24}.

However, a half of the sampled respondents in this study do not always throw away their refuse far-away from their homes/offices/shops. This result corroborates earlier claims that residents tend to pill up of domestic wastes around homes and indiscriminately dispose of it in nearby bushes, roadsides and drainages around their vicinities³⁷⁻³⁹. Also, many respondents do not always throw away all foods/snacks suspected to have been eaten by rats. This result supports earlier finding which reported that majority of the respondents discard their snacks when contaminated while some remove the contaminated portions and consume the remaining part¹⁷. Thus, the recurring incidents of Lassa fever in these states could be linked to these inadequate practices among the residents. The result of the tested hypothesis established that Perceived Behavioural Control is a significant predictor of current practices towards Lassa fever

prevention among residents of the three selected states. This implies that the residents are likely to perform certain behaviours when the perceived level of ease in the performance of such behaviours outweighs the perceived difficulties associated with the behaviours. This finding lends support to previous studies which found that perceived behavioural control was a significant predictor of health-related behaviours.

Conclusion

This study found that the perceived difficulty in performing the preferred behaviours that will reduce the chances of Lassa fever infection via close contacts with rodents is reflected in the current household and environmental hygiene practices. Thus, adoption and non-compliance with the preventive measures are based on the perceived ease and difficulties in performing the recommended behaviours. Therefore, the residents only complied with those household and environmental hygiene practices that they perceived as “easy-to-perform”. The implication of this finding is that the incidence of Lassa fever in these states may linger.

The study recommends that;

1. There is an urgent need for the Ministries of Agriculture and the Environment at the state level and the relevant authorities at the Local Government Councils to establish community-based mechanized food/crops drying facilities at subsidized rates to remove the risks of food contamination by rodents during sun-drying.
2. Extensive use of interpersonal communication channels in door-to-door campaign for the total compliance with the recommended household and environmental hygiene practices for Lassa fever prevention is desirable since interpersonal communication have been widely proved to be an effective channel for influencing health-related behaviours.

Strict monitoring of waste management agencies to ensure proper compliance in providing facilities and waste disposal services in the states as well as regular house-to-house environmental inspection by the Environmental Health Workers.

Acknowledgment

We appreciate the Covenant University Centre for Research, Innovation and Discovery (CUCRID) for funding the publication of this research.

Contribution of authors

Ben-Enukora CA and Oyero SO. conceived, designed the instruments and wrote the introductory part. Ben-Enukora CA collected and analysed the data. Adeyeye BK. coded the data and wrote the method section. Oyesomi, KO conducted the reliability test and translated the FGD responses in Yoruba to English. All authors read and approved the manuscript.

References

1. United Nations. Sixty-ninth session of the United National General Assembly: Draft outcome document of the United Nations summit for the adoption of the post-2015 development agenda. New York: United Nations; 2013. http://www.un.org/ga/search/view_doc.asp?symbol=A/69/L.85&Lang=E
2. Sands P. Making the world safe from the threats of emerging infectious diseases.2018; February 02.Retrieved from<https://www.theglobalfund.org/en/blog/2018-02-02-making-the-world-safe-from-the-threats-of-emerging-infectious-diseases/>
3. World Health Organization.Introduction to Lassa fever managing infectious hazards. 2018. Retrieved from OpenWHO.org.: <https://www.who.int/blueprint/priority-diseases/en/> 6
4. World Health Organization. “Nigeria's Lassa fever outbreak contained, but continued vigilance needed. 2018, May 10. Retrieved from <http://www.afro.who.int/news/nigerias-lassa-fever-outbreak-contained-continued-vigilance-needed>
5. Ike CG, Asogun AD and Sabitu, K. Determination of the presence and spatial prediction of mastomys rodents in a Lassa fever endemic zone of Nigeria. *Clinical Biotechnology and Microbiology*, 2017; 1(2): 60-9.
6. Wirth T and Lalis A. Mice and Men: An evolutionary history of Lassa fever. 2018; DOI: 10.1016/B978-1-78548-277-9.50011-5
7. Adegoke OO, Ajibola OF and Ogundairo JA. Knowledge, attitude, and practices of foodstuff sellers on Lassa fever in major markets in Ibadan. *African Journal for the Psychological Study of Social Issues*, 2017; 2: 165- 76.
8. Ekuma AE and Akpan IS. Lassa fever and infection control: Knowledge, attitudes and practice in a university teaching hospital in Uyo, Nigeria. *Ibom Medical Journal*, 2017; 10(1):40-7.
9. Wirth T and Lalis A. Mice and Men: An evolutionary history of Lassa fever. 2018; DOI: 10.1016/B978-1-78548-277-9.50011-5
10. Mustapha A. Lassa fever: Unveiling the misery of the Nigerian health worker”. *Annals of Nigerian Medicine*, 2017; 11(1):1-5.
11. Burki, T. “Lassa fever in Nigeria: The great unknown. *The Lancet*, 2018; 391(10122): 728.

12. Abimbola M. Rising tide of Lassa fever in Nigeria: Any role for Libraries. *Journal of Health Information*, 2012; 1(1): 53-60.
13. Anuforo E. (The Guardian). "Waging a war against Lassa fever". 2016, January 11. Retrieved from <https://guardian.ng/features/waging-war-against-lassa-fever/>.
14. Usifoh SF, Ighedosa SU, Aighewi T, Asemota O D, Odigie EA and Faboya T. Impact of Lassa fever on the practice and consumption of stored food by University of Benin community, in Benin City, Nigeria. *Journal of Community Medicine and Primary Health Care*, 2014; 30(1): 66-76.
15. Nwankwo SU and Orji A. The fight against Lassa fever in Ebonyi State, Nigeria: A clash of the people's culture and broadcast media campaign. *Journal of Communication and English*, 2017; 2(1): 159-80.
16. Ben-Enukora C, Oyero O, Okorie N and Adeyeye B. Environmental health and the rising prevalence of Lassa fever in Nigeria: Imperative for revitalizing environmental inspection. Proceedings of 34th IBIMA Conference, 2019; 7376-83.
17. Aigbiremolen AO, Ejiyere H.O, Abejegah C, Asalu OB, Abah SO, Edeawe PE and Lawal-Luka RK. Awareness and practice regarding Lassa fever in endemic rural communities in Edo state, Nigeria. *Annals of Medical Research*, 2013; 4: 12-20.
18. Ilesanmi OS, Omotoso B, Alele FO and Adewuyi P. Awareness of Lassa fever in a rural community in South West Nigeria. *Journal of Community Health Research*, 2015; 4(1): 1-10.
19. Adebimpe WO. Community awareness and perception towards rodent control: Implications for prevention and control of Lassa fever in urban slums of south-western Nigeria. *Malta Journal of Health Sciences*, 2015; 2(1): 26.
20. Olalekan AW. Community awareness and perception towards rodent control: Implications for prevention and control of Lassa fever in urban slums of south-western Nigeria. *Malta Journal of Health Sciences*, 2015. Doi: <http://dx.medra.org/10.14614/LASSANIGERIA.2.1.26>
21. Akinwumi AA, Ademola AO, Oladimeji A E, Abiodun OC, Oghenevo AG, Adebola AO, Olarewaju O, Olayinka A and Ojo, BF. Knowledge of Lassa fever among students of a college of education: Call for inclusion in curriculum". *British Journal of Medicine and Medical Research*, 2016; 16(9): 1-8.
22. Aigbiremolen AO, Lawal-Luka RK, Abejegah C, Aigberemwon JA, Abah EO and Abah SO. Environmental risk factors in the transmission of Lassa fever in college students hostels in Ekpoma, a semi urban town in South- South Nigeria. *Annals*, 2018; 3(1):37-43.
23. Adegoke OO, Ajibola OF and Ogundairo JA. Knowledge, attitude, and practices of foodstuff sellers on Lassa fever in major markets in Ibadan. *African Journal for the Psychological Study of Social Issues*, 2017; 2(2): 165- 76.
24. Nwonwu EU, Alo C, Una AF, Madubueze UC, Eze I, Eze NC, Ogonnaya LU and Akamike IC. Knowledge of Combating Lassa fever for sustainable development Lassa fever and its determinants among traders in Izzi community in South-East Nigeria". *Archives of Current Research International*, 2018; 13(4): 1-9.
25. Ajzen I. From intentions to actions: A theory of planned behaviour. In Kuhl J and Beckmann J. (Eds.). *Action control: From cognition to behaviour*. New York: Springer-Verlag, 1985; 11-39.
26. Ajzen I. The theory of planned behavior. In Lange PAM, Kruglanski AW and Higgins ET. (Eds.). *Handbook of Theories of Social Psychology (Vol. 1)*. 2012. London, UK: Sage, 2012; 438-59.
27. Ajzen I. Theory of planned behaviour questionnaire. Measurement instrument database for the social science. 2013. Retrieved from www.midss.ie
28. Ajzen I. The theory of planned behavior: Reactions and reflections. *Psychology and Health*, 2011; 26 (9): 1113.
29. Ajzen I and Madden, TJ. Prediction of goal-directed behavior: Attitudes, intentions, and perceived behavioral control. *Journal of Experimental Social Psychology*, 1986; 22(5): 453-74.
30. Oyero O, Oyesomi K, Abioye T, Ajiboye E and Kayode-Adedeji T. Strategic communication for climate change awareness and behavioural change in Ado-Odo/Ota Local Government of Ogun State. *African Population Studies*, 2018; 32(1):4057-4067.
31. Nigeria Centre for Disease Control and Prevention. 2016/2017 Lassa fever outbreak situation report in Nigeria. 2017, December 24. Retrieved from <https://ncdc.gov.ng/reports/100/2017december-week-51>.
32. Nigeria Centre for Disease Control and Prevention. Lassa fever outbreak Situation Report in Nigeria. 2018 Retrieved from <https://www.cdc.gov/ncepid/dhcpp/index.html>
33. Nigeria Centre for Disease Control and Prevention. Lassa fever outbreak situation report in Nigeria. 2019, April 14. Retrieved from <https://ncdc.gov.ng/diseases/sitreps/?cat=5&name=An%20update%20of%20Lassa%20fever%20outbreak%20in%20Nigeria>
34. Nigeria Centre for Disease Control and Prevention. An update of Lassa fever outbreak in Nigeria for week 17. 2020, April 25. Retrieved from File:///C:/Users/user/Downloads/An%20update%20of%20Lassa%20fever%20outbreak%20in%20Nigeria_250420_17.pdf
35. Krejcie RV and Morgan DW. Determining sample size for research activities. *Educational and Psychological Measurement*, 1970; 30: 607-610.
36. Research Advisors. Sample size table. 2006. Retrieved from <https://www.research-advisors.com/tools/SampleSize.htm>.
37. Olukanni DO, Azuh D E, George TO, Ajayi MP and Emenike PC. The relevance of policy and practice on sanitation effort in developing nations: The experience of a semi-urban city in south-west Nigeria. *Proceedings of ICER Conference*, 2014.
38. Duru CB, Iwu AC, Diwe KC, Uwakwe KA, Merenu I A, Madubueze UC, Okedo-Alex I, Ndukwu E, Ohale I and Nwaigbo E. Environmental sanitation practices:

Ben-Enukora et al.

A case of solid waste management in semi-urban communities in Orlu, Imo State, Nigeria. *ODEM*, 2017; 5(4): 88-105.

39. Ben-Enukora C, Okorie N, Oresanya T and Ekanem, T. Awareness and perception of the health and

Combating Lassa fever for sustainable development

environmental effects of e-waste among residents of Ado-Odo-Ota, Ogun State. *Covenant Journal of Communication*, 2017; 4(2): 18-32.