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Role of optimism bias, knowledge, and demographic profile on perceived infectability to Lassa virus infection

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Abstract

Background: Lassa fever is a highly infectious haemorrhagic fever with potentially severe morbidity and mortality. Little is known about the role of socio-psychological factors fuelling its spread The role of optimism bias, knowledge about Lassa fever symptoms, and demographic profile (gender and educational status) on perceived infectability to Lassa virus infection was investigated.

Method: Three hundred and ninety-one residents of Irrua, a Nigerian community with endemic Lassa fever were selected using multi-stage sampling. The cross sectional survey utilized 54-item questionnaire measuring optimum bias (r=.84); perceived infectability (r=.62); and knowledge of Lassa fever symptoms (r=.84) was used.

Result: Descriptive and inferential statistics were employed in analysis, with three hypotheses tested at p<0.05. Gender ($\bar{x}$ = 2.63; P<.05) and educational status ($\bar{x}$ 2.53; P<.05) differences also affected perceived Lassa fever infectability; with females reporting significantly higher means ($\bar{x}$ 26.68± 6.94) than males ($\bar{x}$ 24.91±6.36). Participants with tertiary education reported higher perceived infectability ($\bar{x}$ 27.63±6.77) than participants with below tertiary education ($\bar{x}$ 25.10±6.24).

Conclusion: These factors are pertinent in understanding perceived infectability/vulnerability to Lassa virus. Attention to these variables and their inclusion in preventive health education are critical in the present multi-disciplinary primary prevention of Lassa infection outbreak in the population.

Keywords: *Optimism bias, Knowledge about Lassa fever symptoms, perceived Lassa virus infectability, Nigeria.*

Résumé

Contexte: La fièvre de Lassa est une fièvre hémorragique très infectieuse pouvant entraîner une morbidité et une mortalité potentiellement graves. On sait peu de choses sur le rôle des facteurs socio-psychologiques qui alimentent sa propagation. Le rôle du biais d'optimisme, de la connaissance des symptômes de la fièvre de Lassa et du profil démographique (sexe et statut scolaire) sur la transmissibilité perçue de l'infection par le virus de Lassa a été étudié.

Méthode: Trois cent quatre-vingt-onze résidents d'Irrua, une communauté nigériane endémique à la fièvre de Lassa, ont été sélectionnés à l'aide d'un échantillonnage à étape multiple. L'enquête transversale a utilisé un questionnaire de 54 questions mesurant le biais optimal (r = 0,84); transmissibilité perçue (r = 0,62); et la connaissance des symptômes de la fièvre de Lassa (r = 0,84) a été utilisée.

Résultat: Des statistiques descriptives et d'inférences ont été utilisées dans l'analyse, avec trois hypothèses testées à p <0,05. Les différences liées au sexe ($\bar{x}$= 2,63; P <0,05) et au statut éducatif ($\bar{x}$= 2,53; P <0,05) ont également affecté la transmissibilité perçue de la fièvre de Lassa ; avec les femmes déclarant des moyennes significativement plus élevées ($\bar{x}$= 26,68 ± 6,94) que les hommes ($\bar{x}$= 24,91 $\bar{x}$± 6,36). Les participants ayant suivi des études supérieures ont signalé une transmissibilité perçue plus élevée ($\bar{x}$= 27,63 ± 6,77) que les participants qui n'avaient pas des études supérieures ($\bar{x}$= 25,10 ± 6,24).

Conclusion : Ces facteurs sont pertinents pour comprendre la transmissibilité / vulnérabilité perçue au virus de Lassa. L'attention portée à ces variables et leur inclusion dans l'éducation préventive à la santé sont essentielles dans le cadre de la prévention primaire multidisciplinaire actuelle d'un déclenchement épidémique de l'infection de Lassa dans la population.

Mots clés: *Biais d'optimisme, connaissances sur les symptômes de la fièvre de Lassa, perception de transmissibilité du virus de Lassa, Nigéria.*

Introduction

Lassa fever is an acute viral illness caused by Lassa virus. The virus, first isolated in a north-eastern Nigerian village, Lassa, in 1969 is a zoonotic, rodent-borne, single-stranded ribonucleic acid [1]. The natural reservoir of the Lassa virus is a 'multimammate rat', Mastomys natalensis [1]. The rats produce large numbers of offspring, and are abundant in the savannah and forests of West, Central, and East Africa. They readily colonize human homes, thus increasing the risk of Lassa virus

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spread from infected rats to humans [2]. Lassa fever presents with no specific symptoms [3]. Definitive diagnosis could therefore be difficult without differential laboratory testing [4].

The risk for contacting Lassa virus infection is both local and global. About 59 million people in Sierra Leone, Guinea, and Nigeria are potentially vulnerable, with an annual incidence of 3 million, and mortality rate as high as 67,000 [5]. Lassa fever cases have been "exported" into the United States of America and Europe by viremic travelers from endemic areas [6], and the possibility of a global spread is high as a result of increased frequency of international travel [2, 6]. The prevalence of Lassa virus antibodies in Nigerian population (21%) is highest compared with other countries in West Africa [7]. A report released by the Nigeria Centre for Disease Control said that as of February 11, 2018, there were 615 reported cases. Of these, 193 cases were confirmed, with 57 deaths [8]. Lassa fever has been spreading at an unprecedented rate in southern Nigeria [9, 10], but little is known about the level of perceived infectability to Lassa virus infection by members of affected communities.

Most of the extant literature on Lassa fever outbreak over the past thirty years [11, 12, 13] focus on clinical and pathological issues, to the neglect of its attitudinal and behavioural components; without which the present efforts at prevention and control of Lassa fever would be inadequate and inchoate. There is no vaccine to prevent Lassa fever [14]. Similarly, current efforts at curtailing the virus is still largely in its trial stages, while there are very few standard Lassa virus laboratories serving about 180 million potentially vulnerable Nigerians [2]. The need for primary prevention is therefore imperative. To address this gap, the present study investigates the role of optimism bias, knowledge and demographic profile on perceived infectability to Lassa virus.

An individual's perceived infectability to Lassa virus infection is his/her subjective observation and recognition of the likelihood of contracting, and subsequently manifesting signs and symptoms of Lassa virus infection or fever. The term perceived vulnerability is used interchangeably in this study. Perceived vulnerability means feeling of being affected as a result of perceived inadequate protection [15]. According to Do and Meekers [16], perception of disease vulnerability forms the basis of risk avoidance behavior.

Perceived infectability to Lassa virus could be explained in the light of existing theories. The Health Belief Model (HBM) stresses that an individual's perceived vulnerability to a disease, perceived severity of the condition, possible benefits of specific preventive behaviour and barriers to carrying out such preventive behaviours influence the individual's health related behavior [17, 18]. This implies that perception of infectability is a major step in becoming conscious of personal infectability and avoidance of primary sources of transmitting a disease. However, adopting these behaviours is rather systematic than spontaneous, involving different cognitive stages.

Many phenomena in the realm of social cognition are influenced by the temporary salience of disease and by individual differences in chronic concerns about disease transmission [19]. These individual differences predict ethnocentric attitudes, disposition to risk avoidance, and other health related behaviours. The emerging implication is that different psychological phenomena (many of which may not be overtly disease-relevant) may predict individual differences in perceived infectability to a potentially pathological micro-organism [20].

Several factors have been linked to perceived infectability to a virus or a disease [21]. Demographic variables such as age and gender [22], as well as psycho-social factors which include knowledge [23] and attitude to a disease [24], have also been related to perceived infectability in an epidemic. According to Welling, Conway, DeBruine, and Jones [24], individuals with high perceived infectability to a micro-organism demonstrated stronger preferences for health than did individuals with relatively low perceived infectability. Although little is known about gender differences in perceived infectability, the gender difference hypothesis holds that males and females are different on most, but not all, psychological variables. The tendency for females to have a greater basal capacity to exercise inhibitory or opposing influence over modulatory environmental contextual factors has been reported in extant literature *[25]*.

Optimism bias is a cognitive bias that causes an individual to mistakenly believe that he/she is at a lesser risk of experiencing a negative event compared to others. Sharot [26] sums it up by saying that we overestimate the likelihood of positive events, and underestimate the likelihood of negative events. For instance, some might underrate their chances of suffering from cancer despite high heritability [27], or underrate their chances of coming down with Lassa fever, despite exposure to Lassa virus. This is "unrealistic optimism," or "illusion of invulnerability." The optimism bias has been found in every race, region, culture, and socioeconomic

category [28]. In contrast to the studies cited, most research regarding optimism bias and physical health suggest that optimism bias affects people negatively [29]. For example, if people are optimistically biased towards their fitness level, the bias could become a factor underlying less likelihood to exercise [30]. In this context, if an individual is optimistically biased towards his perceived infectability to Lassa virus, he/she is less likely to embrace Lassa fever preventive behaviours.

Lassa fever knowledge is one of the variables investigated in this study. It is about the level of awareness or explicit information that an individual has about Lassa virus infection symptoms. The National Bureau of Economic Research, [31] established that the higher the level of an individual's education, the better the health seeking behaviour and healthier outcomes. Also, knowledge of Ebola Virus Disease (EVD) influenced the desire to seek hospital treatment for EVD in a sample of students in Owo, Nigeria [32]. *Aigbiremolen*, Ejiyere, Abejegah, *et al* [33] investigated knowledge and practice of Lassa fever control among health workers. All the respondents were aware of Lassa fever and 77.9% of them had good knowledge of the control of the disease, but less than 17% of them comply with standard preventive practices. In a similar study, 73.9% of the participants had high level of awareness of Lassa fever, but only 54.2% of these believed in its person to person infectability [33], Omotowo [34] reported similar findings in a study among health workers. This may explain why despite their good knowledge, 83% of the sample in Reuben and Gyar's [35] Lassa fever study did not perceive any risk of infectability.

Adefisan [36] asserts that while the search for a potent vaccine continues, it is instructive and worthwhile, as a baseline measure to investigate other attributes of the Lassa fever outbreak. The goal of this research is to examine the role of optimism bias, knowledge and demographic profile on perceived infectability to Lassa virus infection. The objectives of the study of the study are to:

1. Test whether optimism bias (i.e. Negative optimism bias and positive optimism bias) and knowledge of Lassa virus infection symptoms will have significant main and interactive effect on perceived infectability to Lassa virus.
2. Examine whether female respondents will report significantly higher level of perceived infectability to Lassa virus than their male counterparts.
3. Investigate whether respondents with high educational status (i.e. tertiary degree holders) will report significantly higher level of perceived infectability to Lassa virus than those with lower educational status (i.e. no formal educational background, primary school leaving certificate or Senior school leaving certificate).

The study was designed to test the following hypotheses:

1. Optimism bias (i.e. Negative optimism bias and positive optimism bias) and knowledge of Lassa virus infection symptoms will have significant main and interactive effect on perceived infectability to Lassa virus.
2. Female respondents will report significantly higher level of perceived infectability to Lassa virus than their male counterparts.
3. Respondents with high educational status (i.e. tertiary degree holders) will report significantly higher level of perceived infectability to Lassa virus than those with lower educational status (i.e. no formal educational background, primary school leaving certificate or Senior school leaving certificate).

Methods

Design: This study adopted a cross-sectional survey method. The dependent variable is perceived susceptibility to Lassa virus infection, while the independent variables are optimism bias (i.e. Negative optimism bias and positive optimism bias), knowledge about Lassa virus infection symptoms, and demographic factors (gender, and educational status) of members of a community with Lassa virus outbreak.

Setting

It was conducted in Irrua, a semi-urban community located in Edo Central Senatorial District, along the Benin- Abuja highway, about 87 kilometers north of Benin City, Nigeria. It is bounded by Latitudes 6° 42'N - 6 ° 45'N and Longitudes 6° 2'E - 6 ° 16'E [37]. Irrua has a population of 39,042 as documented in a 2010 field survey [38]. The people, called Esans are traditionally agriculturalists and hunters [39]. Lassa fever is endemic with yearly outbreaks in Irrua. A Specialist Teaching Hospital, hosting a Lassa fever research institute is located in the city.

Sampling and participant selection

Multi-stage sampling was adopted to seek research participants made up of individuals and household members in Irrua. Cluster sampling was adopted to identify the political wards in the town, followed by systematic sampling of households in each ward. The

interval was arrived at by dividing the Irrua population size of 39,042 [38] by a desired sample size of 400 participants (in line with the technique applied in a similar study conducted by Momodu, [39], so that the households were picked at intervals until 98 households were selected. In each household, the leader, usually a male (in other instances, it was a female that was available) was approached. The purpose, risks and potential benefits of the study were discussed with the leader, and the consent for research participation of any eligible member of the household was sought, and consenting individual(s) purposively included in the study. Details about participants' demographic profile are found in Table 1.

Selection criteria

Only household members aged 18 years and above, who had lived in the community / ward for at least one year, able to understand and speak English Language, who has also heard about Lassa fever were included.

Ethical consideration

The research proposal, including the research instrument was sent to the Ethics Committee of Irrua Specialist Teaching Hospital for review, followed by ethical approval.

Instruments

A 54-item self-report questionnaire divided into four sections was used for data collection. The 6-item Section A was designed to obtain participants' demographic profile. Section B contained the 22-item Optimum Bias Scale developed by Lapsley and Hill [40]. Sample items include "I can get a sexually transmitted disease if I have unprotected sex," "I can get caught if I cheat in a test." Responses are in a Likert format. Response options were arranged in a 7-point Likert format ranging between "Much below average" =1 and "Much above average"=7. It has negative (19 items with r=.89) and positive (3 items with r=.56) subscales. The instrument was also used by Marx [30] in a similar study. Negative items were reversed in scoring. Scores in the positive and negative optimism bias subscales, as well as the composite score in optimism bias were considered in analysis and interpretation. The scale was revalidated during the study, yielding a Chronbach's alpha of .84, with mean at ($\bar{x}$ =115.25±19.86). High score indicates high level of optimism bias, vice versa.

Section C contained the 7-item perceived infectability sub-scale of the 15-item Perceived Vulnerability scale developed by Duncan, Schaller, and Park [20]. Sample items include "If an illness is 'going around', I will get it", and "It does not make me anxious to be around sick people". Response patterns are scaled between "Strongly disagree=1, and Strongly Agree=7". Negative items were reversed in scoring. Possible scores range between 7 and 49. A revalidation of the scale during the study yielded Cronbach's alpha of .62 and mean is ($\bar{x}$ =25.77± 6.69). Higher scores indicate high level of perceived infectability to Lassa virus, and vice-versa.

Section D contained the 11-item Knowledge of Lassa fever symptoms sub-scale of the 18-item Lassa fever knowledge scale developed by Tobin *et al.* [13]. The 7-item subscale testing method of prevention of Lassa fever in health facility was excluded, because it was designed for use among health professionals involved in Lassa fever management; hence did not meet the goal of this study. Items in the Knowledge of Lassa fever symptoms subscale include: "Bleeding from orifice is a symptom of Lassa virus infection", and Safe food storage can reduce the spread of Lassa virus infection". Responses are in "True" or "False" format. Only True responses are correct. Correct responses attract one point, while wrong responses attract zero. Possible scores range between 0 and 11. A revalidation of the scale yielded .84 reliability; and mean =($\bar{x}$ =7.15±2.15). High score indicates good knowledge of Lassa fever symptoms, vice versa.

Procedure

There was community engagement of the traditional leader and community stakeholders, during which they expressed community willingness to participate in the study. The purpose, risks, and potential benefits of the study were explained. They were assured of their privacy and confidentiality. Each consenting participant was given a copy of the research questionnaire, with instructions on how to respond to the items. Although 400 copies of the questionnaire were given out to consenting participants, only 391 were correctly completed and returned, representing 97.8% response rate.

Data analysis

The independent variables i.e. positive optimism bias, negative optimism bias, (i.e. optimism bias) and Knowledge about Lassa virus infection were categorized into 2 levels each. Analysis of the data included descriptive statistics such as frequency, percentages, and mean, as well as inferential statistics such as 2 X 2 X 2 ANOVA, and t-test at $p<0.05$.

Results

The findings from the data analysis are hereby presented. To answer the question whether an

Table 1: Descriptive statistics showing the demographic characteristics of participants against perceived infectability

Variables	Infectability ($\bar{x}$ &S.D)		Bias ($\bar{x}$ &S.D)		Optimism bias ($\bar{x}$ &S.D)		Optimism bias ($\bar{x}$ &S.D)		Know. ($\bar{x}$ &S.D)	
Age										
<20 years	125(31.9)	25.87(6.55)	>.05	28.72(17.85)	>.05	22.84(16.23)	<.05	5.85(2.85)	>.05	14.59(2.18)	<.01
20-29 years	166(42.4)	25.56(6.40)		31.49(17.97)		25.39(16.70)		6.09(2.93)		14.81(2.32)	
30-39 years	55(14.3)	26.51(7.58)		28.64(15.02)		21.18(15.02)		6.95(2.26)		14.41(1.76)	
40-49 years	33(8.4)	25.33(6.88)		23.30(19.42)		17.12(17.39)		6.33(2.93)		14.12(3.15)	
50-59 years	6(1.5)	20.33(3.78)		16.17(12.73)		10.83(10.48)		4.33(2.94)		11.17(5.56)	
60 years >	6(1.5)	30.67(8.80)		28.17(12.72)		24.00(9.42)		4.83(3.71)		15.00(2.61)	
Sex											
Male	200(51.2)	24.91(6.36)	<.05	29.43(18.01)	>.05	23.46(16.88)	>.05	5.95(2.81)	>.05	14.77(2.45)	>.05
Female	191(48.8)	26.68(6.94)		28.95(17.35)		22.55(15.86)		6.28(2.88)		14.37(2.33)	
Marital Status											
Single	275(70.4)	26.20(6.84)	<.01	31.03(17.88)	<.01	25.08(16.33)	<.01	5.99(2.90)	<.01	14.70(2.22)	>.05
Married	104(26.6)	24.89(5.98)		26.03(15.65)		18.97(15.18)		6.66(2.48)		14.38(2.46)	
Divorced	10(2.6)	21.20(5.09)		7.40(8.81)		4.60(7.31)		3.40(3.50)		13.40(5.15)	
Widowed	1(0.2)	46.00(0)		66.00(0)		54.00(0)		9.00(0)		11.00(0)	
Separated	1(0.2)	23.00(0)		39.00(0)		32.00(0)		5.00(0)		16.00(0)	
Religion											
Christianity	296(75.7)	26.46(6.54)	<.01	30.44(17.47)	<.05	24.28(16.18)	<.05	6.23(2.82)	>.05	14.65(2.35)	>.05
Islam	24(6.1)	21.79(4.96)		24.70(17.66)		18.70(16.07)		5.46(2.93)		14.67(3.55)	
Traditional	28(7.2)	23.00(8.02)		21.59(18.54)		14.63(16.86)		6.29(2.98)		13.79(2.03)	
Others	43(11)	25.02(6.59)		27.75(17.36)		21.75(16.15)		5.51(2.91)		14.51(2.15)	
Occupation											
Student	126(32.2)	26.54(5.99)	>.05	30.02(18.60)	>.05	24.06(16.92)	>.05	6.19(2.86)	>.05	14.63(2.54)	>.05
Artisan	59(15.1)	25.24(6.85)		26.76(18.71)		20.56(16.39)		5.80(3.35)		14.58(2.11)	
Housewife	63(16.1)	24.62(6.87)		31.84(18.46)		25.89(17.56)		5.95(2.32)		14.56(1.82)	
Civil servant	79(20.2)	25.72(7.26)		27.60(16.99)		21.67(15.96)		5.87(2.95)		14.53(1.97)	
Farming	45(11.5)	27.13(7.26)		29.29(13.99)		22.16(13.26)		6.64(2.73)		14.27(3.65)	
Retired	19(4.9)	23.77(6.70)		28.47(16.62)		21.16(17.06)		6.74(2.54)		15.16(1.95)	
Edu. Qual.											
No formal	87(22.2)	24.55(6.58)	<.01	26.65(18.91)	<.05	21.30(17.55)	<.05	5.47(2.95)	<.05	14.48(2.22)	>.05
Primary	64(16.4)	23.43(5.38)		29.88(17.83)		22.83(17.66)		6.52(2.49)		14.77(2.24)	
WASSCE	132(33.7)	27.33(6.77)		27.61(15.41)		21.34(14.05)		6.39(2.83)		14.60(2.58)	
Tertiary	108(27.6)	27.63(6.82)		35.10(16.89)		28.24(15.22)		6.56(2.78)		14.56(2.60)	
TOTAL	391	25.77(6.70)		29.20(17.66)		23.02(16.38)		6.11(2.85)		58.72(11.54)	

Table 2: 2x2x2 ANOVA showing the effect of Lassa fever knowledge, negative and positive optimism bias on perceived Lassa virus infectability

Dependent Variable: Perceived_infectability Source	SS	df	MS	F	p
Lassa fever knowledge (A)	68.185	1	68.185	1.671	>.05
Negative optimism bias (B	1285.269	1	1285.269	31.492	<.01
Positive optimism bias (C)	.829	1	.829	.020	>.05
A * B	10.935	1	10.935	.268	>.05
A * C	129.632	1	129.632	3.176	>.05
B * C	232.035	1	232.035	5.685	<.05
A * B * C	.100	1	.100	.002	>.05
Error	15672.168	384	40.813		
Total	277878.000	392			
Corrected Total	17545.337	391			

a. R Squared = .107 (Adjusted R Squared = .090)

individual's demographic profile affects his/her perceived vulnerability to Lassa virus infection, descriptive statistics was conducted, with the results in table 1

Table 1 shows that a greater proportion of the respondents i.e. 125 (31.9%) were less than 20 years old; 166 (42.4%) were between 20 and 29 years; 55 (14.3%) were between 30 and 39 years old; 33 (8.4%) were between 40 and 49 years old; 6 (1.5%) were between 50 and 59 years old; while the other 6 (1.5%) were 60 years old and above. The mean age was found to be ($\bar{x}$ =28.32±11.03). There was significant age difference in negative optimism bias and Lassa fever knowledge, with no significant age difference in perceived infectability. As regards sex, a greater number of the respondents i.e. 200 (51.2%) were males, while the other 191 (48.8%) were females. A significant mean difference of sex in perceived infectability to Lassa fever was reported.

The profile of the participants educational qualification shows that more of the respondents, i.e. 132 (33.7%) had secondary school leaving certificate; 108 (27.6%) completed one form of tertiary education or the other (i.e. National Diploma / National Certificate of Education / Higher National Diploma / University degree / PhD); 87 (22.2%) had no formal education; while the remaining 64 (16.3%) had primary school leaving certificate. A significant mean difference of educational qualification in perceived infectability was reported.

Hypothesis one

Hypothesis One was designed to test whether positive bias, negative bias (i.e. optimism bias) and Lassa fever knowledge will have significant main and interactive effect on perceived Lassa virus infectability. This was tested using 2x2x2 Analysis of Variance. The result is presented in Table 2.

Table 2 shows that negative optimism bias had significant main effect on perceived Lassa virus infectability [F (1, 384) = 31.49; P<.01], while Lassa fever knowledge [F (1, 384) = 1.67; P>.05] and

Table 3: Main effect of negative optimism bias, and interactive effect of negative and positive optimism bias on perceived Lassa virus infectability

Dependent Variable: Perceived infectability			
Negative Optimism Bias			Std. Error
Low		23.75	.48
High		27.43	.45
Negative optimism bias	Positive optimism Bias		Std. Error
	Low	24.58	.71
Low	High	22.92	.64
	Low	26.69	.69
High	High	28.16	.58

positive optimism bias [F (1, 384) = .02; P>.05] did not. Negative and positive optimism bias had significant interactive effect on perceived Lassa virus infectability [F (1, 384) = 5.69; P<.05]. Negative optimism bias, positive optimism bias, and knowledge of Lassa fever symptoms did not have significant joint influence [F (1, 384) = .002; P>.05]. The hypothesis is therefore not supported.

optimism bias and high level of positive optimism bias reported lowest perceived infectability ($\bar{x}$ = 22.92)

Hypothesis 2 states that female respondents will report significantly higher level of perceived infectability to Lassa virus infection than their male counterparts. This was tested using t-test for independent samples and the result is presented on table 4.

Table 4: T-test Summary showing Sex Mean differences on Perceived infectability

Dependent	Sex	N		SD	T	Df	P
Perceived infectability	Male	200	24.91	6.36	2.63	390	<.05
	Female	191	26.68	6.94			

Table 3 presents further analysis on the main effect of negative optimism bias and interactive effect of negative and positive optimism bias (to test which group is different) on perceived Lassa virus infectability.

Table 3 shows that individuals with high level of negative optimism bias reported higher perceived infectability ($\bar{x}$ = 27.43) than those with low level of negative optimism bias who reported mean score of ($\bar{x}$ = 23.75). Further, individuals with high level of negative optimism bias and high level of positive optimism bias reported highest perceived infectability ($\bar{x}$ = 28.16), while those with low level of negative

There was significant mean difference of Sex on perceived infectability [t (390) = 2.63; P<.05]. with females reporting significantly higher means ($\bar{x}$ = 26.68± 6.94) than males ($\bar{x}$ = 24.91±6.36). Hypothesis 2 is therefore supported.

Table 5: One-Way ANOVA Showing the effect of Educational qualification of perceived infectability

Perceived_infectability Source	SS	Df	MS	F	Sig.
Between Groups	1084.384	3	361.461	8.520	.000
Within Groups	16460.953	388	42.425		
Total	17545.337	391			

Table 6: Multiple Comparison Showing the Effect of Educational Qualification on Perceived Infectability

Educational Qualification	1	2	x	$\overline{SD}$
Below Tertiary Education	2.42*	3.08*	25.10	6.24
Tertiary Education		-	27.63	6.77

** Significant at 0.05*

Hypothesis 3 was designed to test whether educational status has effect on perceived infectability to Lassa virus infection.

Table 5 shows that educational qualification had significant influence on perceived infectablity [F (3, 388) = 8.52; P<.01]. Further post-hoc analysis is presented on Table 6.

Table 6 shows that participants with tertiary education reported highest perceived vulnerability ($\bar{x}$ = 27.63±6.77), while participants with below tertiary education reported significantly lower perceived infectability ($\bar{x}$ = 25.10±6.24), meaning that there exists significant mean difference between those with below tertiary level education and above tertiary level education with a mean difference of (= 2.53; P<.05). Hypothesis 3 is therefore supported.

Discussion

This study examined the role of optimism bias and Lassa fever knowledge, as well as the effect of gender and educational status on perceived Lassa virus infectability in a community affected by Lassa fever outbreak. It became clearer that optimism bias and Lassa fever knowledge jointly influenced perceived Lassa virus infectability, with participants with high level of negative optimism bias reporting higher level of perceived infectability than those with low level of negative optimism bias. Gender and educational status differences also affected perceived Lassa fever infectability, with females reporting higher levels of perceived infectability to Lassa virus infection than their male counterparts. Participants with tertiary education reported higher level of perceived vulnerability to Lassa virus infection compared to those with below tertiary educational attainment.

The revelation that negative optimism bias had significant effect on perceived Lassa virus infectability suggests that the participants had the mistaken belief that their chances of experiencing a negative event (in this case, possibility of being infected with Lassa virus as a result of their exposure Lassa fever outbreak) are lower than that of other members in the same community.

Although, there is a dearth of literature on the influence of negative optimism bias on perceived Lassa virus susceptibility, this result contradicts the finding of Katapodi, Dodd, Lee, and Facione [27] in a study on the influence of optimism bias on perceived vulnerability among cancer patients, but it confirms Sharot's revelation that optimism bias is found in every race, culture, and socioeconomic category [28]. Because a majority of Irrua residents cannot be above the mean rating on perceived infectability unless the distribution is highly skewed, these findings suggests that the sample is optimistically biased in respect of their perceived Lassa virus infectability. It is also possible that participants that are negatively optimistically biased are typically overconfident about their chances of avoiding infection with Lassa virus, i.e. a negative event, irrespective of how their chances compare with those of their peers.

This "illusion of unique invulnerability" may be attributed to cognitive factors. When comparing their risk to that of others, people are egocentric in that they focus more on their own risk factors than on those of the peers to whom they are comparing [41]. The participants' potential tendency to underestimate the likelihood of negative events influenced their perceived low probability of contracting Lassa virus. This suggests the possibility that members of Irrua community, despite persistent Lassa fever outbreaks overvalue their potentials and perceived strengths regarding insusceptibility to the disease, with corresponding underestimation of possible threat of Lassa virus infectability. It could also be due to denial of the morbidity and mortality risks associated with Lassa fever outbreak. This perceived insusceptibility may reduce attention towards adopting Lassa virus infection avoidance behaviours by members of this community, and therefore the possibility of escalating the outbreak of Lassa virus infection in the area.

The present research serves as an evidence based tool required in translational Lassa fever control efforts. It is an eye opener, unmasking potentially significant underlying socio-cognitive factors that might be remotely driving further spread of Lassa fever in the research community. The neglect of negative optimism bias and perceived infectability in past Lassa fever control programmes may possibly reduce the overall effectiveness of such efforts. In practice, this finding has therefore contributed to the literature, by increasing knowledge in the area of counseling needs of communities affected by Lassa fever outbreak. In reducing the possibility of thought biases characteristic of optimism bias, this finding presents an empirical basis for infusion of appropriate psychological interventions into the content of preventive health education of communities at the risk for Lassa virus outbreak, as part of multi-disciplinary approach to curtail the spread of Lassa virus.

The discovery that Lassa fever knowledge did not have significant effect on perceived infectability corroborates findings from previous research [33, 35, 34]. It however contradicts the results of other investigations [32, 31]. However, knowledge about Lassa virus symptoms and optimism bias jointly influenced perceived Lassa virus infectability. This means that knowledge about Lassa virus is not sufficiently influential to affect the participants' perceived Lassa virus infectability, unless combined with optimism bias. Rationally, general awareness

or possession of information, facts, or principles about Lassa fever transmission should spur an individual's tendency to perceive Lassa virus infectability; and this should logically spur individual attitude and behaviours deliberately targeted at Lassa virus risk aversion. By way of illustration, when the driver of a huge truck sees a road sign indicating narrow bridge ahead, he is expected to slow down as he drives towards the bridge to prevent an accident. But thought, perception, attitude and behavior sequences do not follow this sequence in some instances. Not everyone, and not in all instances do people believe important health warnings. There is also the possibility that the research participants have perceived infallibility. This might explain why knowledge about Lassa virus transmission did not influence perceived Lassa virus infectability.

Female participants reported significantly higher levels of perceived infectability to Lassa virus infection than their male counterparts. This means that female participants appreciate their likelihood of getting infected with Lassa virus more than males. It suggests that females and males differ in their perception of the possibility of contracting Lassa virus. This finding supports the gender difference hypothesis concerning inhibitory influence of thought processes on issues related to environmental contextual factors, with females exercising greater control compared to males [25]. It however contradicts the finding that there is insignificant gender difference in negative or positive optimism bias in perceived susceptibility reported by Lapsley and Hill [40]. Participants' social roles and biological differences might have accounted for these. It is possible that inhibition of irrelevant responses (i.e. thoughtful consideration, and deliberate efforts to reduce inclinations to over-estimate individual competence to avoid Lassa virus infection) is an important aspect of cognitive control of a goal-directed behavior towards aversion of Lassa virus infectability, which females in this study seem to possess more than males. Women living in rural and semi-urban communities like Irrua in Nigeria are at risk of Lassa fever because of proximity to animal reservoir, the practice of drying grains by road sides or outside homes and unprotected grain storage within homes [42]. All these factors are known to facilitate increased rodent-man contact or contamination of food sources by infected rodent secretions. Hence, women may have a higher level of perceived susceptibility.

Participants with tertiary education reported higher level of perceived vulnerability to Lassa virus infection compared to those with below-tertiary educational status. This suggests that higher level of exposure to formal education at Masters and PhD levels led to other forms of experiences that made participants with tertiary education perceive higher level of likely Lassa virus infectability. At postgraduate level of education, enrollees are exposed to multi-faceted exposures, greater value for good health and quality of life. Such individuals would likely be extra mindful of potential threats to life, especially risk for contracting Lassa fever in a community with endemic Lassa virus outbreak.

This study has a few limitations. It may be necessary to include other Lassa fever endemic areas in Nigeria to increase the generalizability. Measuring perceived infectability or vulnerability to an endemic infection is not as simple as drawing inferences from responses to survey questionnaires suggests. More reliable and robust data gathering techniques that combine laboratory, epidemiological and qualitative approaches would improve both the validity as well as knowledge about the content and context of research data and findings.

Conclusion

Lassa fever is a highly infectious haemorrhagic fever with potentially severe morbidity and mortality. Little is known about the role of socio-psychological factors fuelling its spread. This study is unique in the sense that it established that optimism bias and knowledge of Lassa virus infection symptoms have significant interactive effect on perceived Lassa virus infectability, with negative optimism bias having significant independent effect. Female respondents have higher level of perceived infectability to Lassa virus than their male counterparts. Respondents with high educational status have higher level of perceived infectability to Lassa virus than those with lower educational status. Hypotheses 2 and 3 are therefore supported.

Having established the level of optimism bias and its influence on perceived Lassa virus infectability in this study, we recommended community-sensitization on personal and environmental hygiene. It is also suggested that community residents be taken through some forms of cognitive restructuring to correct the bias to address the socio-psychological factors fuelling Lassa fever transmission.

Lassa fever remains an important cause of morbidity and mortality in Nigeria and many parts of West Africa. The probability of using Lassa fever outbreak as an instrument of global bio-terrorism exists. Greater attention to perceived infectability among residents of affected communities is

fundamental to the primary prevention of this endemic and lethal disease.

References

1. Adebayo D, Nwobi EA, Vincent T and Gonzalez JP. Response Preparedness to Viral Hemorrhagic Fever in Nigeria: Risk Perception, Attitude towards Lassa fever. Epidemiology (sunnyvale). 2015; 5:199. doi:10.4172/2161-1165.1000199.
2. Adefisan AK. The Level of Awareness that Rat is a Vector of Lassa Fever among the Rural People in Ijebu-North Local Government, Ogun State, Nigeria. Journal of Education and Practice. 2014;5(37)166. ISSN 2222-1735 (Paper) ISSN 2222-288X (Online).
3. Aigbiremolen AO, Duru CB, Awunor NS, *et al.* Knowledge and application of infectious diseases control measures among Primary Care workers in Nigeria: The Lassa fever example. International Journal of Basic, Applied and Innovative Research. 2012;1(4).
4. Atkin S, Anaraki S, Gothard P, *et al.* The first case of Lassa fever imported from Mali to the United Kingdom. European Surveillance. 2009;14(10).
5. Becker MH. The health belief model and personal health behavior. Health Education Monographs. 1974; 2: 324-588.
6. Chambers JR and Windschitl PD. Biases in social comparative judgments: The role of nonmotivated factors in above-average and comparative optimism effects. Psychological Bulletin. 2004; *130*: 813-838.
7. CDC, Nigeria. Lassa Fever Outbreak in Nigeria, Serial Number: 06 Epi -Week:06, Date: 11 February , 2018. http://ncdc.gov.ng/themes/common/files/sitreps/384bdfdc4dcc80dc8ad7dc8ca0a58abc.pd
8. CDC. Lassa fever Index. 2018. Available via: https://www.cdc.gov/vhf/lassa/index.html
9. Do M and Meekers D. Multiple sex partners and perceived risk of HIV infection in Zambia: attitudinal determinants and their gender differences. Paper presented at the Annual Meeting of the Population Association of America, New Orleans, April (2008).
10. Duncan LA, Schaller M and Park JH. Perceived vulnerability to disease: Development and validation of a 15-item self-report instrument. Personality and Individual Differences. 2009; 47: 541–546.
11. Ehichioya DU, Asogun DA, Ehimuan J. *et al.* Hospital-based surveillance for Lassa fever in Edo State, Nigeria, 2005-2008. Tropical Medicine and International Health. 2002; 17: 1001- 1004.
12. Esan World Congress Incorporated. "History of Esan People of Edo State, the Eagles of Nigeria, "The Ogidigans." 2018. Available at http://www.esancongress.org/culture.html.
13. Fichet-Calvet E. and Rogers DJ. Risk Maps of Lassa Fever in West Africa. PLoS Neglected Tropical Diseases. 2009; 3:13.
14. Garrard M, Gibbons FX and Bushman BJ. Relationship between perceived vulnerability to HIV and precautionary sexual behaviour. Psychological Bulletin. 1996; 119 (3), 390-409.
15. Ilesanmi O and Alele FO. Knowledge, Attitude and Perception of Ebola Virus Disease among Secondary School Students in Ondo State, Nigeria. PLOS Current Outbreaks. 2016; Edition 1. doi: 10.1371/currents.outbreaks.c04b88ed 5cd 03cccb99c125657cccd76.
16. Katapodi MC, Dodd MJ, Lee KA and Facione NC. Underestimation of breast cancer risk: Influence on screening behavior. Oncology Nursing Forum. 2009; 36(3), 306-314. doi:10.1188/09.ONF.306-314.
17. Lapsley DK and Hill PL. Subjective Invulnerability, Optimism Bias and Adjustment in Emerging Adulthood, Journal of Youth and Adolescence. 2009. DOI 10.1007/s10964-009-9409-9.
18. Mansouri FA. Fehring DJ, Gaillard A, Jaberzadeh S and Parkington H. Sex dependency of inhibitory control functions. Biological Sex Differences. 2016; 7:11. doi:10.1186/s13293-016-0065-y. PMC 4746892/. PMID 26862388.
19. Marx K. "Optimism Bias in Fitness". Digital Commons @ ACU, Electronic Theses and Dissertations. 2016; 23.
20. Mofolorunsho KC. Outbreak of lassa fever in Nigeria: measures for prevention and control. The Pan African Medical Journal. 2016; 23:210. doi:10.11604/pamj.2016.23.210.892.
21. Momodu OM. Information needs of farmers: A case study of Esan West Local Government Area of Edo State, Nigeria, International Journal of Community Research. 2013, 2(1):1- 7.
22. Monath TP, Maher M, Casals J and Kissling RE. Cacciapuoti. Lassa fever in the Eastern Province of Sierra Leone, 1970-1972: II. Clinical observations and virological studies on selected hospital cases. American Journal of Tropical Medicine and Hygiene. 1974; 23, 11240-1149.
23. Murray AL. Editorial: The implications of the optimistic bias for nursing and health. Special

Issue. European Doctoral Conference in Nursing. 2011; 20(17-18) 2588-2590.

24. Nadezhda EY and Walker H. Pathogenesis of Lassa fever. Viruses. 2012; 4, 2031-2048.
25. Nasir AI and Sani MF. Outbreak, pathogen containment and laboratory investigation of Lassa fever in Nigeria: How prepared are we? International Journal of Tropical Disease and Health. 2015;10(1):1-10.
26. National Bureau of Economic Research. The Effects of Education on Health http://www.nber.org/digest/mar07/w12352.html (accessed May 30, 2018).
27. Ogbu O, Ajuluchukwu E and Uneke CJ. Lassa fever in West African sub-region: an overview. Journal of Vector Borne Diseases. 2007; 44, 1-11.
28. Ogoina D. Lassa Fever: A clinical and epidemiological review. Niger Delta Journal of Medicine and Medical Research. 2013; 1 (1); 1-10. Available at: https://www.researchgate.net/publication/276270028_Lassa_fever_A_Clinical_and_Epidemiological_Review.
29. Ojeifo OM and Eseigbe JO. Categorization of Urban Centres in Edo State, Nigeria IOSR Journal of Business and Management (IOSRJBM), ISSN: 2278, 2012; 3 (6):19-25. http://iosrjournals.org/iosr-jbm/papers/vol3-issue6/D0361925.pdf.
30. Omotowo B. Assessment of Knowledge, Attitudes, and Practices Regarding Lassa Fever among Health Care Workers in a Tertiary Hospital, Enugu, South-East Nigeria: Implications for Control. Conference Paper at the Second World Conference on Infectious Diseases, Philadephia, USA. 2016. Available at: https://www.researchgate.net/publication/308786432.
31. Rainisch G, Shankar M, Wellman M, Merlin T and Meltzer MI. Regional spread of Ebola virus West Africa. Emerging Infectious Diseases, 2015; 21, 447-447.
32. Reuben RC and Gyar SD. Knowledge, attitudes and practices of Lassa fever in and around Lafia, Central Nigeria. International Journal of Public Health and Epidemiology Research. 2016; 2(1): 014-019.
33. Rosenstock IM. Why people use health services. Milbank Memorial Fund Quarterly. 1966; 44: 94.
34. Salufu SO and Ujuanbi O. The Geology and Structural Geology of Ekpoma and Irrua: Implication for the Hydrology and Hydrogeologic Setting of the Areas. Nigerian Annals of Natural Sciences. 2015; 15(1) 131 – 138.
35. Schaller M. and Duncan LA. The behavioral immune system: its evolution and social psychological implications. In Evolution and the social mind (eds Forgas J. P., Haselton M. G., von Hippel W., editors.). Psychology Press. 2007; 293–307.
36. Sharot T. The optimism bias. Current biology,2011; 21(23):941-945. https://doi.org/10.1016/j.cub.2011.10.030.
37. Sharot T. The optimism bias. 2012. Retrieved from https://www.ted.com/talks/tali_sharot_the_optimism_bias?language=en#t-24593.
38. Tobin EA, Asogun DA, Isah EC Ugege OG and Ebhodaghe P. Assessment of knowledge and attitude towards Lassa fever among Primary care providers in an endemic sub-urban community of Edo state: Implications for control. Journal of Medical Science. 2013; 4: 311-318.
39. Umoren, AM and Adejumo AO. Role of Sexual Risk Behaviours and Sexual Attitude in Perceived HIV Vulnerability among Youths with Disabilities in Two Nigerian Cities. Sexuality and Disability. 2014; 32(3): 323-334.
40. Ward EG, Disch, WB, Levy JA and Schensul JJ. Perception of HIV/AIDS risk among urban, low-income senior housing residents. AIDS Education and Prevention. 2004;16(6):571-589.
41. Welling LLM, Conway CA, DeBruine, L M and Jones B.C. Perceived Vulnerability to disease is positively related to the strength of preferences for apparent health in faces. Journal of Evolutionary Psychology. 2007;5(1–4): 131–139.
42. World Health Organisation. Lassa Fever: Fact Sheet. 2017 Available via http://www.who.int/mediacentre/factsheets/fs179/en/.