

**A MODERN APPROACH TO DISSEMINATING HEALTH RISK COMMUNICATION  
TO LOCAL COMMUNITIES:**

**A PILOT STUDY**

**BY**

**INFODEMICS.COM**

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## ABSTRACT

*In Nigeria, catastrophic effects of zoonotic diseases such as Ebola, Lassa fever, Dengue, rabies, and yellow fever have been reported in the last 5 years. These epidemic outbreaks are usually followed by a slew of rumors which spread quickly over the fast and vast social media network. People become confused and fearful, emphasizing the need for timely information management. This research is a pilot study of infodemics.com in rural communities of Rivers state; a case study to assess the effect of an infodemics.com intervention on the knowledge of Lassa fever among rural community dwellers to identify the channels of communication used by gatekeepers, disseminate health risk information down to the community dwellers and compare the knowledge of Lassa fever and its prevention between intervention and non-intervention communities. The population is studied, paying heed to inclusion and exclusion criteria and appropriate sampling of a portion of the population using questionnaires. Out of the 356 respondents in the survey, results show that among the intervention group, marital status comprised 78.7% single and 15.7% married while the non-intervention group had 76.4% single and 23.6% married respondents respectively. In the intervention group, 22.5% have tertiary level of education, 75.3% secondary school level and 2.2% at primary school level of education respectively; while the non-intervention group has 25.5% with tertiary level, 54.5% secondary level and 20.0% at primary school level of education distribution. The chart shows that 124 (69.7%) and 48 (43.6%) had a mobile phone in the intervention and non-intervention groups respectively. Those who could read and understand English were 172 (96.6%), and 106 (96.4%) in the intervention and non-intervention groups respectively. The study reveals that among the intervention group, 80.9% had fair knowledge and 19.1% had poor knowledge, and among the non-intervention group, 30.9% had fair knowledge and 69.1% had poor knowledge. There was a statistically significant difference in the knowledge of Lassa fever between the intervention and non-intervention group Pearson's chi-square = 50.477,  $P < 0.0001$ . The graph shows that 46.1% and 44.9% of respondents among the intervention group Agreed and Strongly agreed to the preventive measures listed; while 56.4% and 30.9% Agreed and Strongly agreed among the non-intervention group. This study reveals that there was a statistically significant improvement in knowledge of Lassa fever following intervention with the infodemics.com web application for risk communication.*

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# **CHAPTER ONE**

## **INTRODUCTION**

### **1.1 Background**

The world is confronted with recurrent epidemics and other public health events that impact negatively on human health whose origin may be traced to nonhuman sources. Disease occurrence and spread are related to environmental factors, animal health, climate change and other human activities such as travel, urbanization, and globalization. Diseases at the human-animal ecosystem interface (e.g. zoonotic diseases, water/food borne diseases, vector-borne diseases) continue to pose threats to humans and animals with increasingly significant morbidity and mortality.

In Nigeria, catastrophic effects of zoonotic diseases such as Ebola, Lassa fever, Dengue, rabies, and yellow fever have been reported in the last 5 years. With these epidemic outbreaks, rumors which appear very quickly are spread by the fast and vast social media leaving people confused and fearful and thus emphasizing the need for timely information management.

The role of the media is essential with journalists and scientists obliged to report and exhibit concrete and convincing proof about the nature of epidemics, explaining promptly the reasons for control interventions while being led by health authorities (WHO, 2018). It is important to focus on rumors that can prevent a large portion of the population from being informed about the necessity of following an urgent anti-epidemic measure.

Infodemics.com is a web-based platform that harnesses technological prowess to disseminate real-time information, advice, and opinions (via Unstructured Supplementary Service Data (USSD) and Interactive Voice Response (IVR) among other channels) between experts and people facing threats to their health, economic or social well-being irrespective of their location and social status (Infodemics ,2019) . These important messages are strategically disseminated to leadership circles in communities including religious and traditional leaders, youth leaders and groups who serve as trusted message sources for the community. Messages are planned and relayed according to the language of each group and sent as such to enable proper understanding.

Infodemics uses algorithms to facilitate feedback from the community and helps the deployment of personnel and resources where necessary (Infodemics ,2019). This technology can also point out disease outbreak hot zones for travelers and offer safety tips.

### **1.2 Problem Statement**

The 21st century has been marked by major epidemics. Old diseases such as cholera and yellow fever have returned and new ones like SARS, influenza, MERS, Ebola and Zika have emerged. These epidemics and their impact on the global public health have convinced the world's governments of the need for a collective and coordinated defense against emerging public health threats and accelerated the revision of the International Health Regulations (2005) entered into force in 2007. Another Ebola or influenza pandemic is no longer mere probabilities; the threat is real.

Lassa fever (LF) is a disease worth of immediate notification on the Integrated Disease Surveillance and Response (IDSR) platform in Nigeria. An estimated 300,000 -500,000 cases and 5,000 related deaths occur annually in West Africa (NCDC,2019). In 2018, the Nigerian

Centre for Disease Control (NCDC) reported the largest ever number cases in Nigeria, with over 600 confirmed cases and over 170 deaths. The increase is not thought to be due to any new virus strains, and may at least be partially explained by increasing surveillance capacity (NCDC,2019)

The actual incidence rate in Nigeria is unknown, but case fatality rates range from 3% to 42% (and over the last two years has remained between 20% and 25%). Historically, outbreaks occur during the dry season (November to April), however, in recent years, cases have also occurred during the rainy season (NCDC 2019)

A massive wave of laboratory-confirmed cases of Lassa fever occurred in Nigeria in 2018. Whether this high case count was caused by a new virus variant, increased seasonal incidence, improved case recognition, availability of laboratory diagnostics and therapy, or a combination of these factors is unknown. It is important that all frontline responders: community, government officials, non-State actors and public health professionals, respond rapidly and effectively when an outbreak is detected (WHO,2018).

### **1.3 Justification**

Weak surveillance and paucity of scientific data make it difficult to quantify the true burden of epidemic-prone diseases in most African countries (NCDC 2019). Besides the public health burden, disease outbreaks in Africa have a serious impact on the economies of the affected countries due to production losses, implications on livestock trade and international travel (smith et al 2019). Nigeria is considered to have one of the highest burdens of endemic diseases globally (Maiyaki & Garbari, 2014). Diseases like Ebola, Lassa fever, cholera and tuberculosis intermittently cause outbreaks in the population, but their neglected nature provides a false perception of low public health importance.

Whether these diseases are transmitted by mosquitoes or other insects, contact with animals or person-to-person, the only major uncertainty is when and where they or a new but equally lethal epidemic will emerge. These diseases all have the potential to spread internationally highlighting the importance of immediate and coordinated responses.

Despite the huge burden of endemic diseases and increased risks of the emergence of novel epidemic-prone diseases, there is little awareness and information management on epidemic-prone diseases, even among health professionals in Nigeria. While there is no single intervention that can address all epidemic scenarios, it is now increasingly recognized that the establishment of inter-sectoral collaborative mechanisms with efficient information sharing is the most efficient strategy to improve the epidemic response (WHO,2000). Infodemics.com is an effort in the direction of responsive information management.

### **1.4 Aims and Objectives**

To pilot infodemics.com in rural communities of Rivers state, using Lassa fever disease as a Case study

- i. To assess the effect of infodemics.com intervention on the knowledge of Lassa fever among rural community dwellers
- ii. To identify the channels of communication used by gatekeepers to disseminate information down to the community dwellers
- iii. To determine and compare the knowledge of Lassa fever and its prevention between intervention and non-intervention communities.

### **1.5 Significance**

This study will validate infodemics.com as a health information dissemination application. It will compare the difference between the methods of infodemics.com and other conventional methods of information dissemination.

### **1.6 Scope**

The study is a 6-month pilot study, that would involve the change in baseline knowledge of Lassa fever before and after the use of infodemics.com in two rural communities in Andoni Local Government Area of Rivers State.



## CHAPTER TWO

### LITERATURE REVIEW

#### 2.1 Conceptual Frame Work

Of the estimated 1400 diseases known to affect man, 60% are of animal (zoonotic) origin. Similarly, of the emerging infectious diseases reported globally, 75% are zoonotic (Jones *et al.*,2008). Occurrence and spread of most of these diseases are related to environmental factors, animal health, climate change and other human activities such as travel, urbanization, and globalization (Jones *et al.*,2008). Public health response to these events also requires a multidisciplinary approach to implements programs, policies, and inter-sector research, all at the local, regional, and global levels, to achieve optimal health outcomes, recognizing the interconnection between people, animals, plants, and their shared environment. Following this, Nigeria adopted the Center of Disease Control (CDC) “One Health Approach”, central to which is information management and inter-sector collaboration between different specialties of experts (WHO,2019).

The media plays a tremendous role in increasing awareness among susceptible populations in an attempt to reduce their contact with infection. It has the potential of generating a psychological impact on social conduct, a quasi-experiment done in tertiary hospitals in Nigeria involving 104 Retroviral positive patients showed that reminder text messaging improved patients adherence by 72% (Maduka & Tobin-west, 2013). Many modelers of epidemics stress the effect of awareness through media in the outbreaks of diseases (Wang & Xiao, 2014).

The Infodemics platform is a web-based tool that uses real-time information updates from the Nigerian Center for Disease Control (NCDC) to broadcast the risk of an outbreak or outbreak progress to the population at risk. The NCDC was established in the year 2011 in response to the challenges of public health emergencies and to enhance Nigeria’s preparedness and response to epidemics through prevention, detection, and control of communicable diseases (NCDC,2019). Infodemics.com is in line with NCDC core mandate: ‘to protect the health of Nigerians through evidence-based prevention, integrated disease surveillance and response activities, using a One Health approach, guided by research and led by a skilled workforce.’

## The Solution: infodemics.com

- Information flowing in two directions
- Using existing social hierarchies
- Information verified by experts
- Manage epidemics geographically

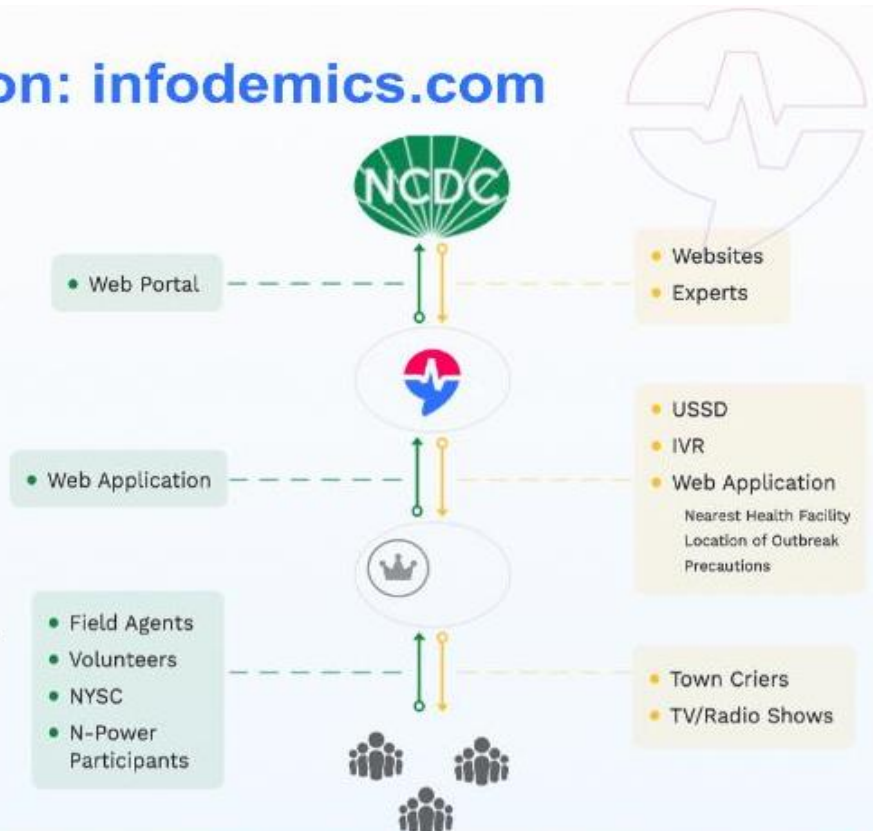


Figure 2.1: Structure of the Infodemics.com solution

## 2.2 Advantages of Infodemics.com

Infodemics.com offers vertical and horizontal communication ability. Vertical communication involves a two-way communication between entity such as the NCDC using the platform to the health gatekeepers of the community of interest using interactive voice responses (IVR), text messages and the like in local dialects to sensitize and educate the community leaders to help the coordination efforts of the community during the event of or threat of an outbreak. There is the second leg of the vertical messaging which involves feedback responses collected via surveys methods to assess knowledge, attitude and practice of disseminated information and how it modifies community risk status.

The Infodemics platforms, also defines its horizontal communication ability as the accommodation of information sharing between experts in different fields, fostering inter-sector and interdisciplinary collaboration in the fight to control epidemic-prone diseases. An example would be recent events showing a greater connection between animal and human health and thus establishing clearer automated lines of communication between veterinary and medical professionals concerning preventive medicine and public health, clinical practices or research will be a boon.

## 2.3 Lassa Fever

Lassa fever (LF) is caused by a single-stranded RNA virus of the family *Arenaviridae*. It is endemic in Guinea, Sierra Leone, Liberia, and parts of Nigeria, and also in other countries in the West African sub-region. It is also a zoonotic disease, whose animal reservoir is a rat of the genus *Mastomys* (the ‘multimammate’ rat) (Consortium,2020 ). People become infected through direct exposure to the excreta of infected rats, or by transmission from person to person via body fluids.

Lassa infection is asymptomatic in about 80% of cases but causes an acute illness in the rest. Fever and general weakness are followed by headache, chest pain, vomiting, diarrhoea, cough, pleural effusion, bleeding from orifices, and in the late stages sometimes disorientation and coma (CDC,2004). Deafness occurs in 25% of cases. In fatal cases, it kills rapidly – usually within 14 days. The overall case fatality rate is around 1%, rising to 15% of hospitalized cases. (Consortium,2020 ).

An accurate diagnosis can be assisted with differential laboratory testing, clinical manifestations, epidemiological findings since definitive diagnosis requires investigations available only in highly specialized laboratories (Nasir & Sani, 2015).

Early treatment of Lassa fever is very important for survival and requires specialized treatment using the guanosine analog ribavirin. Care must also be taken to avoid the spread of the disease in hospital settings.(Aching *et al.*, 2013)

Due to the absence of a vaccine against the virus and the impractical control of the rodent host (*mastomys species*) population, control measures are limited to keeping rodents out of homes and food supplies and also maintaining proper personal hygiene. Using these rodents as food sources should be discouraged (Adewuyi *et al.*,2009). Enlightenment and awareness of the public on risk factors associated with the spread of disease are important for prevention (Ogbu *et al.*,2007).

Also, protective measures should be put in place to reduce human infection. Infected persons should be isolated and their body fluids and excrements properly disposed of. Healthcare workers should take proper precautions to curtail the nosocomial spread of disease through the use of Personal Protective Equipment (PPE).

## **CHAPTER THREE METHODOLOGY**

### **3.1 Study Area**

Rivers state is one of the thirty-six states in Nigeria. It is located in the southern part of Nigeria in the Niger Delta region. It has 23 local government areas (LGA) (2 urban and 21 rural), with 319 political wards with Port Harcourt as the capital (15). The study was conducted in two randomly selected communities in the Andoni LGA located in the south-east senatorial zone of Rivers State, situated at 4°32'57"N, 7°26'47"E. Andoni is rural, comprising of 76 towns and villages, with its LGA headquarters at Ngo. It occupies a land area of about 233km<sup>2</sup> and has a population of about 311,500 with an estimated growth rate of 3.2% (NPC & ICF, 2019). It is served by one general hospital, seventeen primary health centers and three private hospitals. The major source of drinking water of the residents is well and streams. The people speak the Obolo dialects with their main occupation being fishing. They share similar festivals with Opobo, Nkoro, and Bonny (NPC & ICF, 2019). The Andoni communities have suffered repeated outbreaks of some epidemic diseases including cholera and yellow fever and they border Ebonyi state which has suffered cases of Lassa fever virus outbreak.

### **3.2 Study Design**

Quasi-experimental interventional study with infodemic.com risk assessment tool as intervention.

#### **3.2.1 Study Population**

- i. Community Gatekeepers
- ii. Community residents

#### **3.3.1 Inclusion Criteria**

- i. Participants who give verbal consent
- ii. Community dwellers that are 10 years and above

#### **3.3.2 Exclusion Criteria**

- i. Mentally unstable residents who are judged unable to give reliable reports.
- ii. Sick residents of the selected community

### **3.4 Sample Size**

Sample size was calculated using the formula for comparing two proportions (Lwanga & Lemeshow 1991)

$$n = \frac{\left( Z_{\alpha/2} + Z_{1-\beta} \right)^2 [P_1(1 - P_1) + P_2(1 - P_2)]}{(p_1 - p_2)^2}$$

n = minimum sample size per group

$Z_{\alpha/2}$  = standard normal deviate corresponding to 5% level of significance = 1.96

$Z_{1-\beta}$  = standard normal deviate corresponding to a power of 80% = 0.84

$P_1$  = 59.2% of people from a study done in Ile-Ife had inadequate knowledge of Lassa fever disease (16).

$P_2$  = 69.1% of people from a study done in Osogbo reported good knowledge of Lassa fever via conventional means of health education (Adebimpe, W. O. (2015).

$P_1 - P_2$  = the smallest difference between the two groups of scientific or clinical importance which the study would not want to miss

Thus 160 participants per Community, making a total sample size of 320.

Attrition rate of 10% = 36

Making a total sample size of 356 participants, with 178 persons per community

### **3.5 Sampling Method**

Sampling was done using a multi-stage sampling technique that involved three stages.

Stage 1: Involved the selection of two communities from the 76 communities that make up Andoni LGA using a simple random sampling by ballots, using a list of communities provided by the local government council as sampling frame. Dema and Ibotiriem were the selected communities.

Stage 2: Involved selection of households by systematic random sampling, using an interval of 2, using the formula  $K=N/n$  to derive the sampling interval, implying that every 2<sup>nd</sup> household was sampled. The outcome of household sampling was 356 households, 178 per community.

Stage 3: Involved selection of 1 respondent from each household by Simple random sampling technique. The steps were repeated for the comparison community B.

### **3.6 Study Instrument**

- i. Infodemics.com web-based risk assessment application
- ii. interviewer-administered semi-structured questionnaire
- iii. key informant interviews for gatekeepers
- iv. Scientific Calculator Casio Fx911

### **3.7 Outcome Measures**

- i. 7 days of information recall
- ii. The implementation rate of cascading information
- iii. knowledge ratings

### **3.8 Data Management and Analysis and manuscript Development**

Questionnaires were screened for completeness, coded and entered by the researcher into the Statistical Package for Social Sciences (SPSS) version 25. Descriptive statistics in the form of means and standard deviation were used for numerical data that are normally distributed, while categorical variables were expressed as frequencies and proportions. Data was presented as frequency tables and charts. The overall proportions/percentages for all respondents for each subscale will be compared between intervention and non-intervention communities using chi-square test for difference in proportions.

### **3.9 Ethics**

Ethics approval was obtained from the Rivers State Ministry of Health Ethics Review Board in line with the Helsinki declaration (Appendix II). Confidentiality was maintained as information; data gotten was stored on secure hardware and limited to only those involved in the trial. Participants were assured that their personally identifiable information obtained during the trial would be kept in confidence by the investigator. Participants were free to withdraw voluntarily at any stage of the study. Precautions were taken to reduce to the barest minimum any form of inconveniences to the participants as a result of the trial proceedings. The method of patient selection was scientifically objective and fairness ensured.

## **CHAPTER FOUR**

### **RESULT**

#### **4.1 Socio-demographic Characteristics of Respondents**

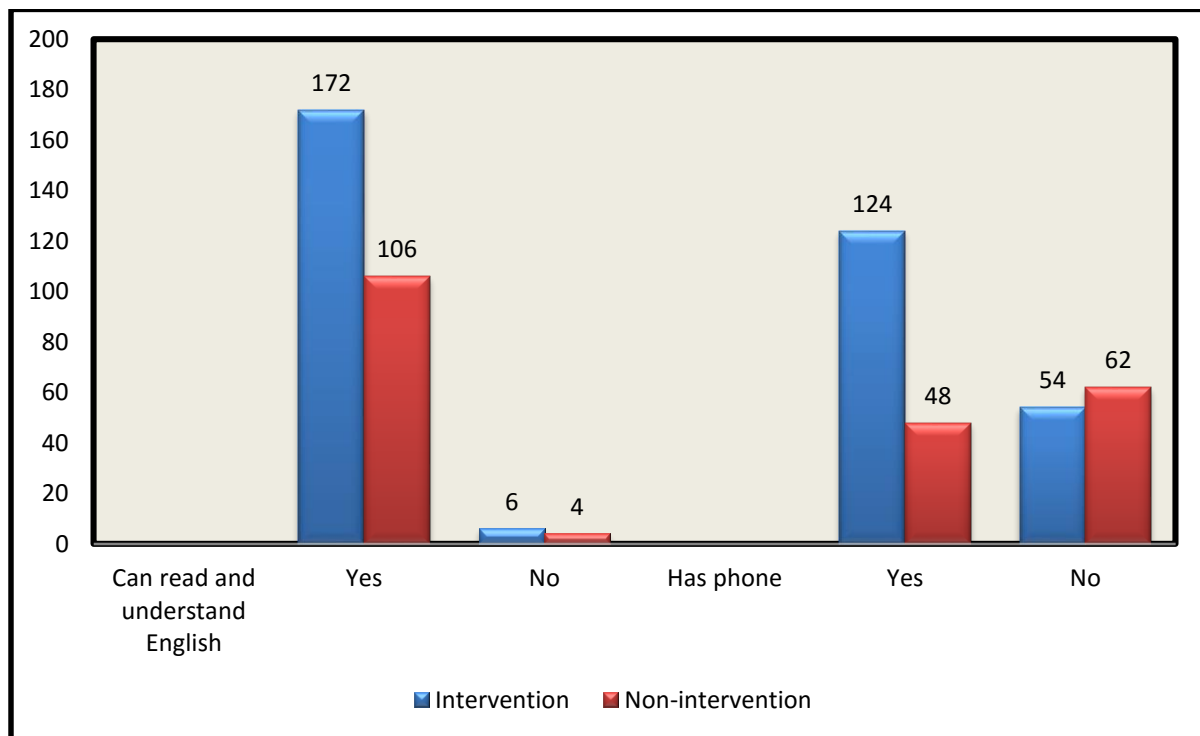
There were a total of 356 respondents in the survey, with 288 properly filled and analyzed, 68 questionnaires were discarded for incomplete data and attrition, Respondents comprised 178 in intervention and 110 in the non-intervention groups respectively. The mean age of the respondents was  $39.25 \pm 6.08$  years and between the intervention and non-intervention groups, the mean ages were  $38.75 \pm 5.92$  and  $30.05 \pm 6.29$  years respectively. The respondents consist more of males (104, 58.4%) than females (74, 41.6%) in the intervention group but more females (62, 56.4%) than males (47, 43.6%) in the non-intervention group.

Among the intervention group, marital status comprised 78.7% singles and 15.7% married while the non-intervention group had 76.4% singles and 23.6% married respondents respectively.

Education level among the intervention group features 22.5% tertiary level, 75.3% secondary level and 2.2% primary level; while the non-intervention features 25.5% tertiary level, 54.5% secondary level and 20.0% primary level of education respectively.

Most of the respondents were students, constituting 56.2% and 52.7% in both intervention and non-intervention groups; Owners of small enterprises constituted 19.1% and 27.3% in the intervention and non-intervention groups; the majority of whom were Christians, accounting for 98.9% and 100% in the intervention and non-intervention groups respectively. The communities surveyed were predominantly Christian.





**Figure 4.1: Distributions of Respondents that can read/understand English and Phone Possession**

the chart shows that 124 (69.7%) and 48 (43.6%) had a phone in the intervention and non-intervention groups respectively. Those who could read and understand English were 172 (which is 96.6% ), and 106 (96.4%) between the intervention and non-intervention groups respectively.

#### **4.2 Source of Information on Lassa Fever**

Among the intervention group, the popular sources of knowledge were via health talk 36.4%, church 29.5%, and Public announcements 34.1% while in the non-intervention group, the main sources of knowledge were friends 69.2% and public announcements 23.9% respectively. The difference is the source of knowledge is influenced by the intervention earlier provided for the intervention groups via their community leaders. The community without intervention did not receive any knowledge of this disease from church or by health talks.

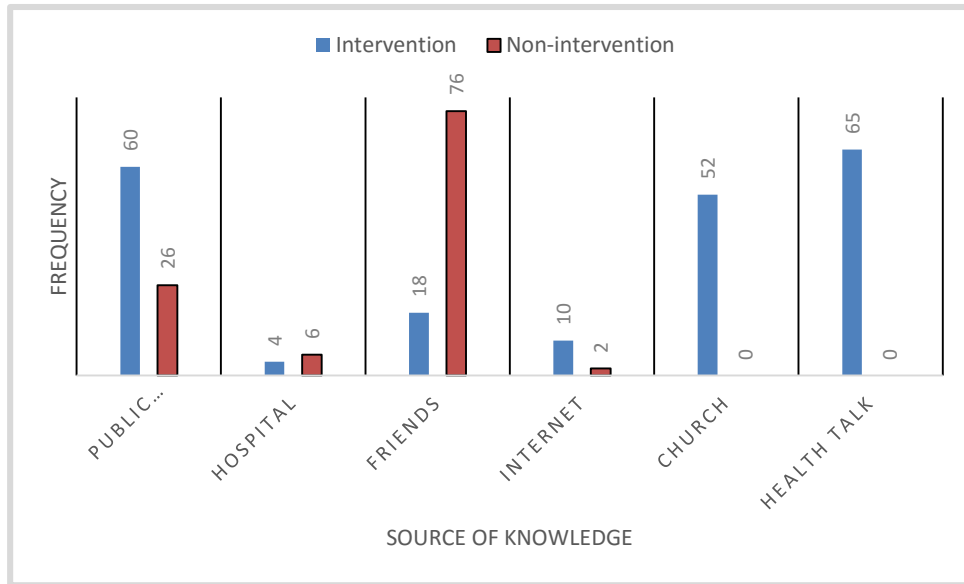


Figure 4.2: Source of Knowledge of Lassa fever among Respondents

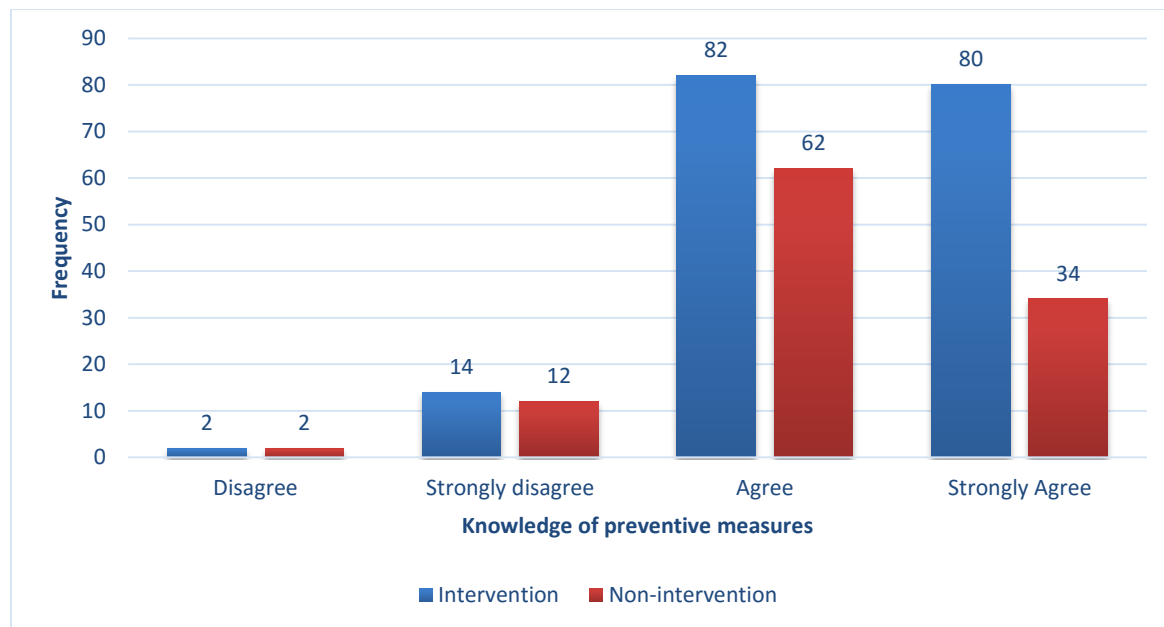
### **4.3 Assessment of Knowledge of Lassa Fever**

Using the total of five questions to access the knowledge of Lassa fever among respondents, which tested their knowledge of the source, transmission, symptoms, and cure for Lassa fever, the study reveals that among the intervention group, 80.9% had fair knowledge and 19.1% had poor knowledge, and among the non-intervention group, 30.9% had fair knowledge and 69.1% had poor knowledge. There was a statistically significant difference in Knowledge of Lassa fever between the intervention and non-intervention group Pearson's chi-square = 50.477,  $P < 0.0001$ .

### **4.3 Assessment of Knowledge of the Preventive Measures for Lassa Fever**

A total of eight items were used to assess the knowledge of preventive measures for Lassa Fever among the study sample. The items were in the form of a 4 scale Like scale. They were to Disagree, Strongly disagree, Agree or Strongly agree to any of the items, which featured gutter clearing, house cleaning, hand washing, domestic cat, closure of rodent holes, avoiding body fluid contact with an infected person and safe storage of food as preventive measures.

This study reveals that respondents from the intervention group had a better knowledge of preventive measures of Lassa fever than the respondents in the non-intervention group. The graph shows that 46.1% and 44.9% of respondents among the intervention group Agreed and Strongly agreed to the preventive measures listed; while 56.4% and 30.9% Agreed and Strongly agreed among the non-intervention group. The Chi-square statistical test of difference for both groups shows a statistically insignificant difference in their knowledge of preventive measures.



**Figure 4.3: Assessment of Knowledge of Preventive Measures for Lassa Fever**

## CHAPTER FIVE

### DISCUSSION AND CONCLUSION

#### 5.1 Discussion

Before the intervention, 69.2% of the respondents in the non-intervention community reported peer information sharing as their main source of information about Lassa fever. This finding is consistent with findings of an HIV/AIDS awareness study conducted in Imo state which reported the commonest source of health information to be from friends and relatives (Wang & Xiao, 2014). Though it is an easy and simple way of information dissemination, it is subject to alteration of the content and may easily lead to the spread of misinformed opinions. With the *infodemics.com* intervention, information spread via the gatekeepers of the community increased sources of information from health talks at schools, churches and community sensitization announcement, retaining the original content of the information and passed to residents in their local dialect.

Following the intervention with Infodemics, 80.1% of the respondents in the intervention community demonstrated good knowledge of the cause, transmission, symptoms, and care for Lassa fever. This is comparable to findings by (Maduka *et al.*, 2013) who achieved 76.9% adherence following text messaging reminder to enhance adherence (Nwagwu, 2008). Though the Infodemics intervention achieved a much higher impact, the finding can be explained by the level of assimilation of information when a message is sent in the local dialect of the recipient, even within a short time the understanding and effect on practice is marked (Maduke & TobinWest, 2013).

## **5.2 Conclusion and Recommendation**

This study provides a base that consistent provision of health information would gradually enlighten a community on any topic of concern. This study reveals that there was a statistically significant improvement in the knowledge of Lassa fever following the intervention with the Infodemics web application for risk communication. We recommend the application of *Infodemic.com* in the dissemination of health information.

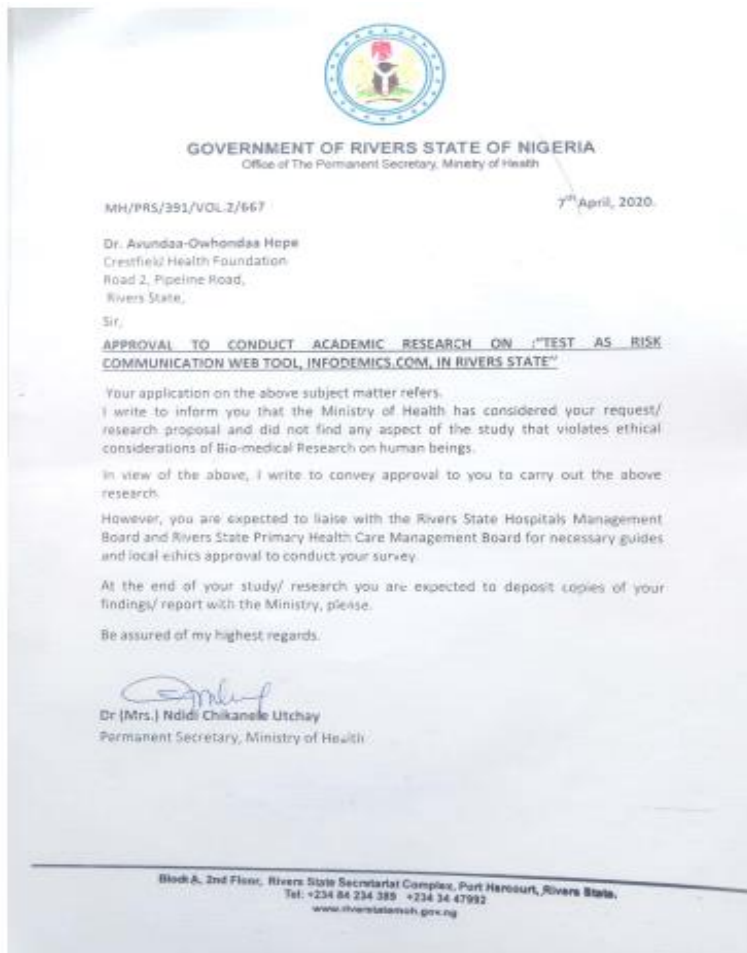
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## Appendix I



## Appendix II



## Appendix III

