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Assessment of the Knowledge and Attitude of People towards Lassa fever in Akure South Local Government, Ondo State, Nigeria

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Abstract: Lassa fever is an acute viral zoonotic illness caused by Lassa virus, an arena virus known to be responsible for a severe haemorrhagic fever characterized by fever, muscle aches, sore throat, nausea, vomiting, and chest and abdominal pain. The main objective of this study is to assess the knowledge and attitude of people towards Lassa fever in Akure South Local Government, Ondo State, Nigeria.
A descriptive survey research design was adopted. This design was chosen because it helped to have an in-depth understanding of the knowledge and attitude of people towards Lassa fever in Akure South Local Government, Ondo State, Nigeria. Sample size of 776 was determined using Yamane Taro, (1967) formula and was selected by multistage sampling techniques. Data were collated and analyzed using Statistical Package for Social Science (SPSS) version 25.
This research showed that: majority 730 (95.4%) of the respondents have heard of Lassa fever before. Their main source of information on Lassa fever is media 430 (56.2%) followed by hospital 80 (10.5%). Majority 740 (96.7%) of the respondents agreed they know what causes Lassa fever. Majority 680 (88.2) of the respondents have good knowledge on Lassa fever and 18 (11.8%) of the respondents have poor knowledge on Lassa fever. All 765 (100.0%) of the respondents have made an attempt trying to eradicate the rats in their homes. Majority 605 (79.1%) of the respondents used to cover their foods (both raw and cooked) at home. Most 710 (92.8%) of the respondents covers their foods every day, 45 (5.9%) do so only when they think rats are in the house and 10 (1.3%) used to cover their foods any time they remember.
Based on the findings of this study, the following are hereby recommended: (1) The government via the Federal Ministry of Health should continuously and intensively health educate the populace on the problems of Lassa fever, its vector control and treatment. (2) Food items should be cooked before consumption, as the Lassa fever virus is known to be heat labile. (3) Plastic and metal containers such as aluminum pots with covers should be used for storing food items.
Keywords: Knowledge, Attitude, Lassa fever.

INTRODUCTION

Theoretical Frame Work

Lassa fever is a viral haemorrhagic fever caused by a single stranded RNA virus belonging to the Arenaviridae family, it is a zoonotic disease whose reservoir is the multimammate rat of the genus Mastomys. Humans are infected by exposure to food or household items contaminated with excreta or urine of infected rodents, processing of infected rats for consumption, airborne through the inhalation of tiny particles in the air contaminated with infected rodent excretions or reuse of infected needles (Yun & Walker, 2019).

Person-to-person transmission also occur especially among healthcare workers through direct contact with body fluids of infected persons, often due to a lack of appropriate infection, prevention and control (IPC) measures whilst receiving care. Lassa fever was first discovered in 1969 in Nigeria following the death of two missionary nurses in Lassa town, Borno State (McCormick, Saluzzo & Dodet, 2015). The disease is endemic in West Africa countries of Sierra-Leone, Liberia, Guinea and Nigeria where about 300,000 to 400,000 cases occur annually with approximately 5,000 deaths. Cases have also been reported in Central African Republic, Democratic Republic of the Congo, Mali and Senegal. Lassa fever cases are difficult to differentiate from other febrile illness and if not well managed could result to high fatality rates (Obadare *et al.*, 2016).

In Nigeria, Lassa fever is one of the seven epidemic prone notifiable diseases reportable under the Integrated Disease Surveillance System (IDSR), a suspected case is considered an alert threshold and one confirmed case an epidemic threshold. Sporadic outbreaks occur annually, and have been reported in over one-third of states in Nigeria. There is however paucity of publications on the magnitude of the disease in the country. This could affect early preparedness and

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resource allocation which helps in the control of the disease (Radoshitzky *et al.,* 2019).

EMPIRICAL FRAMEWORK

Lassa fever vector

The natural hosts for the virus are multimammate rats (Mastomysnatalensis), which breed frequently and are distributed widely throughout west, central, and east Africa. They are probably the most common rodent in tropical Africa and are found predominantly in rural areas, and in dwellings more often than in surrounding countryside (Tambo, Adetunde & Olalubi, 2018).

Members of the genus are infected persistently and shed the virus in their excreta. Humans are infected by contact with the rats or by eating them (they are considered a delicacy and are eaten by up to 90% of people in some areas). Rats found in houses of infected people are seropositive for the virus 10 times more often than those in control houses. Virus antibodies occur after a febrile illness in twice as many people who eat rats as in those who do not, and deafness (an effect of Lassa fever) occurs four times more frequently (Ogbu, Ajuluchukwu & Uneke, 2017).

Transmission of Lassa fever

The reservoir, or host, of Lassa virus is a rodent known as the "multimammate rat" (Mastomysnatalensis). Once infected, this rodent is able to excrete virus in urine for an extended time period, maybe for the rest of its life. Mastomys rodents breed frequently, produce large numbers of offspring, and are numerous in the savannas and forests of west, central, and east Africa (Fichet-Calvet *et al.,* 2017). In addition, Mastomys readily colonize human homes and areas where food is stored. All of these factors contribute to the relatively efficient spread of Lassa virus from infected rodents to humans. Transmission of Lassa virus to humans occurs most commonly through ingestion or inhalation. Mastomys rodents shed the virus in urine and droppings and direct contact with these materials, through touching soiled objects, eating contaminated food, or exposure to open cuts or sores, can lead to infection (Richmond & Baglole, 2018).

Because Mastomys rodents often live in and around homes and scavenge on leftover human food items or poorly stored food, direct contact transmission is common. Mastomys rodents are sometimes consumed as a food source and infection may occur when rodents are caught and prepared. Contact with the virus may also occur when a person inhales tiny particles in the air contaminated with infected rodent excretions. This aerosol or airborne transmission may occur during cleaning activities, such as sweeping (CDC, 2020).

Direct contact with infected rodents is not the only way in which people are infected; person-to-person transmission may occur after exposure to virus in the blood, tissue, secretions, or excretions of a Lassa virus-infected individual. Casual contact (including skin-to-skin contact without exchange of body fluids) does not spread Lassa virus. Person-to-person transmission is common in health care settings (called nosocomial transmission) where proper personal protective equipment (PPE) is not available or not used. Lassa virus may be spread in contaminated medical equipment, such as reused needles (WHO, 2017).

Signs and symptoms of Lassa fever

According to TerMeulen, Lukashevich and Sidibe (2019), Lassa fever presents with symptoms and signs indistinguishable from those of febrile illnesses such as malaria and other viral haemorrhagic fevers such as Ebola. It is difficult to diagnose clinically but should be suspected in patients with fever (≥38°C) not responding adequately to antimalarial and antibiotic drugs. Signs and symptoms of Lassa fever typically occur 1-3 weeks after the patient comes into contact with the virus. For the majority of Lassa fever virus infections (approximately 80%), symptoms are mild and are undiagnosed.

Signs and symptoms include: slight fever, general malaise and weakness, headache, hemorrhaging (in gums, eyes, or nose, as examples), respiratory distress, repeated vomiting, facial swelling, pain in the chest, back pain, abdomen pain, shock, hearing loss, tremors, encephalitis, pharyngitis, retrosternal pain, proteinuria, sore throat, and vomiting

Stages of Lassa fever

According to Centers for Disease Control (CDC) (2020), the stages of Lassa fever are:

Stage	Symptoms
1 (1-3 days)	General weakness and malaise. High fever, >39°C, constant with peaks of 40-41°C
2 (4-7 days)	Sore throat (with white exudative patches) very common; headache; back, chest, side, or abdominal pain; conjunctivitis; nausea and vomiting; diarrhoea; productive cough; proteinuria; low blood pressure (systolic <100 mm Hg); anaemia
3 (after 7 days)	Facial oedema; convulsions; mucosal bleeding (mouth, nose, eyes); internal bleeding; confusion or disorientation
4 (after 14 days)	Coma and death

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Pattern of infections

The monthly cases of Lassa fever virus infection over the years revealed significant difference across the months of the year. Higher infections and deaths occurred during the dry months than the wet months. Increase in infections was observed at the onset of the dry season in November and progressively increases in December, January, peaking in February after which it began to decrease until May when the wet season sets in. Highest cases of LASV infection occurred in the month February in the four years of observation. The trend given below was observed throughout the four years (Tambo, Adetunde & Olalubi 2018).

Diagnosis

Because the symptoms of Lassa fever are so varied and non-specific, clinical diagnosis is often difficult, especially early in the course of the disease. Lassa fever is difficult to distinguish from other viral haemorrhagic fevers such as Ebola virus disease as well as other diseases that cause fever, including malaria, shigellosis, typhoid fever and yellow fever (WHO, 2017). According to NCDC (2019) definitive diagnosis requires testing that is available only in reference laboratories. Laboratory specimens may be hazardous and must be handled with extreme care. Lassa virus infections can only be diagnosed definitively in the laboratory using the following tests:

- Reverse Transcriptase Polymerase Chain Reaction (RT-PCR) Assay
- Antibody Enzyme-Linked Immunosorbent Assay (ELISA)
- Antigen Detection Tests
- Virus Isolation by Cell Culture.

Lassa fever is most often diagnosed by using enzyme-linked immunosorbent serologic assays (ELISA), which detect IgM and IgG antibodies as well as Lassa antigen. Reverse transcription-polymerase chain reaction (RT-PCR) can be used in the early stage of disease. The virus itself may be cultured in 7 to 10 days, but this procedure should only be done in a high containment laboratory with good laboratory practices. Immunohistochemistry, performed on formalin-fixed tissue specimens, can be used to make a post-mortem diagnosis (CDC, 2020).

Complications of Lassa fever

The most common complication of Lassa fever is deafness. Various degrees of deafness occur in approximately one-third of infections, and in many cases hearing loss is permanent. As far as is known, severity of the disease does not affect this complication: deafness may develop in mild as well as in severe cases (Richmond & Baglole, 2015). Approximately 15%-20% of patients hospitalized for Lassa fever die from the illness. However, only 1% of all Lassa virus infections result in death. The death rates for women in the third trimester of pregnancy are particularly high. Spontaneous abortion is a serious complication of infection with an estimated 95% mortality in fetuses of infected pregnant mothers (Shaffer *et al.*, 2018).

Case fatality rate

The case fatality rate (CFR) from Lassa fever in Nigeria was highest at the onset of the outbreak in 2017 with a fatality rate of 26.5%. It decreased little in 2018 to 23.7% and further decrease to 19.6 and 13.4% in 2019 and 2020 respectively. The cumulative CFR over the last four years stood at 18.5%. There is fluctuation in the CFR across the states (Sade, 2021).

Knowledge and attitude of people towards Lassa fever

In 2020, a study on the knowledge, attitude, and practices regarding Lassa fever was undertaken in Eboyi state among 813 men and 867 women in four communities and eight primary health units. The survey revealed a reasonable knowledge of Lassa fever, its mode of transmission, control measures, and the seriousness of the disease. However, there were some worrying gaps in application of this knowledge, such as inappropriate actions after killing rats. This was demonstrated by the occurrence of an outbreak of 201 cases, including 60 deaths (case fatality rate 19%), from January 2017 to April 2020, despite an extensive outreach programme. The study therefore highlighted the need for an increased awareness on the appropriate methods for disposing dead rats in this state (Busayo, 2021).

The need for greater understanding of the perceptions and beliefs of the local population became apparent after a small pilot study (of 23 people) was undertaken in 2017. In this study, Data were collected by means of focus groups and semi-structured interviews, which were facilitated by trained local health workers. Two groups consisting of chiefs, elders, female, male adults and male youths were conducted, one in an affected and the other a non-affected region of Edo state. Two interviews with relatives of patients on the Lassa fever ward and one with a nurse were also conducted. Data were collected in or translated into English, tape-recorded, transcribed and analysed thematically. Participants were asked about the socio-economic impact of issues relating to risk factors, early diagnosis, medical treatment and the sequelae of Lassa fever (Obabori, Ebosele & Mokidi, 2021)

One of the risk factors for Lassa fever voiced by participants related to rodent control. Without exception, it was suggested that rodent control and a clean

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environment would reduce the risk of Lassa fever and other similar diseases. However, it was reported that not everybody in the community shared this knowledge and that further education relating to this is requirement (Busayo, 2021).

More specific to Lassa fever, the social calamities of miscarriage and deafness were discussed at length. In relation to miscarriage, the blame appears to lie directly with the woman. Participants suggested miscarriage is often attributed to witchcraft and commonly leads to the breakdown of a marriage (Tambo, Adetunde & Olalubi, 2018). Throughout the data, repeated references were made to the social embarrassment caused by Lassa fever. The issue of social exclusion appears to be linked with reluctance to seek a diagnosis of, or medical treatment for the symptoms of Lassa fever. The need for further education, specifically in relation to the safe disposal of rat carcasses and the mode of human transmission was deemed necessary in order that people are absolutely clear about specific risk factors, but do not fear and isolate people unnecessarily. It was reported that in reality, early diagnosis is impeded by lack of knowledge and the absence of a test that may be carried out in the communities (Sade, 2021).

Both groups discussed the need to educate the population about the signs and symptoms of Lassa fever. In addition, the group from the affected area discussed the necessity for a local laboratory in their area (Ogbu, Ajuluchukwu & Uneke, 2017). The deterrents met in seeking appropriate medical treatment to the disease caused by the vector was highlighted in this small pilot study, participants suggested for a variety of reasons that many people were unlikely to seek medical care for the Lassa fever. In the first instance, medical treatment is expensive and may be accessed at the direct expense of other necessities such as food for the family and school fees. Participants repeatedly explained that when one member of the family required medical treatment, the other members suffered financial hardship, even hunger. Cultural issues such as a belief in traditional remedies and mistrust of the medical treatment offered at the hospital were also described as important. Participants in each group and interview reported this apparently common belief that people are killed after being admitted to the Lassa fever ward. In addition to financial and cultural factors, participants discussed the practical problems that arises when parents are hospitalised, in particular, childcare and maintaining agricultural commitment". It was suggested that such commitments prevent people using medical facilities (Busayo, 2021).

In 2019 a local study was done in Esan central of Edo state in Nigeria to compare the case-fatality rates of Lassa fever and other medical diseases commonly seen in adult medical wards, as well as to determine the community habits that make Lassa fever endemic in Edo Central District of Nigeria, with the aim of prescribing preventive measures for its control in Nigeria. The records of 908 inpatients in the adult medical wards of Irrua Specialist Teaching Hospital, Irrua and responses from respondents interviewed by trained interviewers on their knowledge, attitudes and practices pertaining to Lassa fever were used. The case-fatality rate of Lassa fever in this centre was 28%. Cultural factors and habits were found to favour endemicity of Lassa fever in Edo Central District of Nigeria. Number of cases in this centre was found to have a monthly variation that peaks between January and March every year. The large sample size of this study is an advantage since it must have increased the validity of the result (Adewuyi, Fowotade, & Adewuyi, 2019).

Control measures adopted against the Lassa fever vector

According to Asogun (2018), prevention of the Lassa virus from its host to humans can be achieved by avoiding contact with Mastomys rodents, especially in the geographic regions where outbreaks occur. Using these rodents as a food source is not recommended. Trapping in and around homes can also help reduce rodent populations. Putting food away in rodent-proof containers and keeping the home clean help to discourage rodents from entering homes. Various kinds of metal food storage bins have been devised and are unquestionably effective. Adoption of these effective means of rodent-proof food storage in individual houses would undoubtedly reduce the Mastomys population and also reduce the attractiveness of such houses to invading rats. In this way, rodents in houses would be reduced as well as evaded. Means of reducing pest numbers fall into two categories:

- Those that affect the characteristics of the species (use of chemosterilants, toxicants such as zinc phosphide, and of anticoagulant rodenticide); and
- Those that modify environmental conditions in such a way as to be detrimental or lethal to the vector species such as keeping food out of the reach of rodents. Although chemosterilants have achieved some degree of success in the field trials, primarily against rats, in actual use such materials possess most of the disadvantages of conventional toxicants and, in addition, are extremely slow to act and to show effect. For example, in a successful experiment done in 1973 in South Africa, investigators were able to reduce a rat population by 75% in 6 months (Barnes, 2015)

In many cases, unanticipated biological and physiological factors have been said to reduce or prevent success in field trial and practice. The use of anticoagulant rodenticides offers certain advantages over acute toxicants in almost any situation requiring rodent poisoning, not only because of their relative safety for man and other non-target species, but also because their slow action makes bait shyness far less likely to develop among target rodents than it would if acute poisons were used (This day, 2018).

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However, this control method in general suffers from lack of knowledge and has often resulted in large amount of chemicals being distributed in the environment without the desired control effects. In order to achieve any degree of success, rodenticidal programmes, if used alone, must be not only well-founded and based on considerable knowledge of Mastomys and its environment, but also, of necessity, persistent and repetitive. How repetitive such a programme might need to be in practice can be illustrated by available data, provided in the reviews presented by Dr Coetzee and Dr Isaacson in 1975. This review presented a composite picture of the biology of Mastomys natalensis in West Africa as follows:

- Breeding season-about 10 months of the year.
- Average age at sexual maturity-approximately 90 days.
- Gestation period of 23 days.
- Average time between litters of 25 days (postpartum oestrus).
- Average number per litter is 10.
- Average number in litter reaching recruitment age is 8.5.
- Average longevity-approximately is 1 year (Adewuyi, Fowotade, & Adewuyi, 2019).

From this data it was estimated that a hypothetical population would return to its carrying capacity density in approximately 4 months even if a 90% control was achieved with acute toxicants and rodenticides and migration ignored. Thus, a well-conducted programme depending entirely on acute toxicants would need to be carried out at least twice per year-perhaps three times to achieve more than temporary success (Richard, & Deborah, 2016).

Appraisal of review of related literature

Lassa virus (LASV) is the most prominent human pathogen of the Arenaviridae. The virus is transmitted to humans by a rodent reservoir, Mastomys natalensis, and is capable of causing lethal Lassa Fever (LF). LASV has the highest human impact of any of the viral hemorrhagic fevers (with the exception of Dengue Fever) with an estimated several hundred thousand infections annually, resulting in thousands of deaths in Western Africa (Sade, 2021). The sizeable disease burden, numerous imported cases of LF in non-endemic countries, and the possibility that LASV can be used as an agent of biological warfare make a strong case for vaccine development. Presently there is no licensed vaccine against LF or approved treatment. Recently, several promising vaccine candidates have been developed which can potentially target different groups at risk. Lassa virus (LASV) is transmitted to humans by a rodent reservoir, Mastomys natalensis, and is capable of causing lethal Lassa Fever (LF) disease (Busayo, 2021).

There is no licensed vaccine for the prevention of LF and vaccine development efforts are hampered by both the high cost of non-human primate (NHP) animal models and biocontainment requirements (BSL-4) for study and development. LASV has the highest human impact of any of the hemorrhagic fever viruses (with the exception of Dengue fever) with an estimated 100,000-300,000 infections and 5,000-10,000 deaths annually in western Africa. Based on prospective studies performed in four of the most affected countries, Guinea, Sierra-Leone, Liberia, and Nigeria, it was estimated that 59 million people are at risk of primary LASV infections with an annual incidence of disease as high as 3 million and as many as 67,000 deaths per year (Adewuyi, Fowotade, & Adewuyi, 2019).

RESEARCH METHODS

Study Design

This was a descriptive study to assess the knowledge and attitude of people towards Lassa fever in Akure South Local Government, Ondo State, Nigeria. Furthermore, the questionnaire was administered to elicit other relevant information.

Total population

The population of Akure South Local Government based on 2006 national census is 353,211.

Inclusion criteria

All inhabitants of Akure South Local Government within the age of 18-45 years and above who consent to participate in the study.

Exclusion criteria

All inhabitants of Akure South Local Government below the age of 18 years and those who declined consent to participate in the study.

Sample size determination

The minimum sample size used to determine the formula for descriptive study. The formula is given as:

$n=\frac{N}{1+N(e^2}$ (Yamane Taro, 1967)

Where,

n = desire sample size for the study

N = Population size for the study = 2,250

e = A value representing how error to allow from estimate in the study.

95%= 0.05, 98% = 0.02, 99% = 0.01 etc.

Therefore, by using this formula, $n=\frac{N}{1+N(e^2)}$ (N=2,250, E=0.02)

$n=\frac{2,250}{1+2,250(0.02^2)}$

$n=\frac{2,250}{1+2,250\times0.0004}$

$n=\frac{2,250}{1.9}$

n= 1,184

n= 1,184 (this is the sample size for the study)

Thus, the minimum sample size is 1,184

Since my target population is less than 10000 then,

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nf= $\frac{n}{1+n/N}$

Where nf= desired sample size when population is less than 10000

n= desired sample size when population is greater than 10000

N= total population size (which was given to be 1,184)

By substituting,

nf= $\frac{1,184}{1+1,184/2250}$

nf= $\frac{1,184}{1.5262}$

nf= 775.8

nf ≈ 776

Sample and Sampling techniques

A multistage sampling technique was used in selecting respondents in this study. The selection was in 3 stages as follows:

- **Stage 1:** Purposive sampling technique was used to select people aged 18 years and above from 153 households based on availability and consent from Akure South Local Government.
- **Stage 2:** Simple random sampling technique was used to select 5 people from each household unit from Akure South Local Government by ballot method.
- **Stage 3:** Eligible people selected from each household were recruited for this study. Where a respondent from selected household declined consent or has any of the exclusion criteria, the next household on the sampling frame was randomly selected until the desired sample size was reached.

Research Instruments

An interviewer structured questionnaire was used for this study. The questionnaire was developed and adapted from reviewed literatures and was used to gather information on the knowledge and attitude of people towards Lassa fever in Akure South Local Government, Ondo state. The questionnaire was divided into two sections A & B.

Section A: elicit socio-demographic information of the respondents.

Section B: While assess knowledge and attitude of people towards Lassa fever in Akure South Local Government.

RESULTS OR FINDING

Data Analysis and Interpretation

Response rate: Out of the 776 questionnaire that were distributed, only 765 were retrieved making 98% response rate

Table 1: Respondents' Socio Demographic Characteristics

Variable	Number	Percentage (%)
Age		
15-24 years	65	8.5%
25-34 years	280	36.6%
35-44 years	305	39.9%
45-54 years	115	15.0%
Marital Status		
Married	480	62.8%
Divorced	61	8.0%
Widowed	113	14.8%
Single	111	14.5%
Ethnicity		
Yoruba	685	89.5%
Igbo	60	7.8%
Hausa	15	2.0%
Fulani	5	0.7%
Religion		
Christianity	640	83.7%
Islam	110	14.4%
Traditional	15	2.0%
Educational Status		
Primary	170	22.2%
Secondary	219	28.6%
Informal (Vocational)	35	4.6%
Tertiary	115	15.0%
None	226	29.5%

From table 1 above, the mean age distribution was 43.59 (SD = 10.67). A higher percentage 480 (62.8%) of the respondents were married, 61 (8.0%) were divorced, 111 (14.5%) were single, and 113 (14.8%)

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were widowed. Majority of the respondents 685 (89.5%) were Yoruba, 60 (7.8%) were Igbo, 15 (2.0%) were Hausa and 5 (0.7%) were Fulani. A higher percentage 640 (83.7%) were Christians, 110 (14.4%) were Muslims while 15 (2.0%) were traditionalists. Majority of the respondents 226 (29.5%) had no form of education. 170 (22.2%) attained primary school education level. 170 (22.2%) attained secondary school education level and 115 (15.0%) attained tertiary education level.

Answering Research Questions

Question 1: What is the level of knowledge of Lassa fever among people in Akure South Local Government, Ondo State, Nigeria?

Table 2: Level of knowledge of Lassa fever among people in Akure South Local Government, Ondo State, Nigeria.

Variables	Number	Frequencies
Have you heard of the word Lassa fever		
Yes	730	95.4%
No	35	4.6%
If yes, from where?		
Hospital	80	10.5%
Media (television, radio, newspaper e.t.c)	430	56.2%
Church	60	7.8%
Mosque	20	2.6%
Market	170	22.2%
Others	5	0.7%
Do you know what causes Lassa fever		
Yes	740	96.7%
No	25	3.3%
If yes, then what?		0.0%
Dirty environment	160	20.9%
Rat	605	79.1%
drinking unclean water		0.0%
Others		0.0%
Do you think Lassa fever can kill?		
Yes	605	79.1%
No	160	20.9%
Do you know anyone that was sick of Lassa fever?		
Yes	20	2.6%
No	745	97.4%
If yes, who is this person to you?	0	0.0%
a relative	0	0.0%
a friend	0	0.0%
a neighbor	0	0.0%
Others	20	2.6%

Data from table 4.2 above shows that majority 730 (95.4%) of the respondents have heard of Lassa fever before. Their main source of information on Lassa fever is media 430 (56.2%) followed by hospital 80 (10.5%). Majority 740 (96.7%) of the respondents agreed they know what causes Lassa fever. most 605 (79.1%) of the respondents identifies rat as the cause of Lassa fever while others 160 (20.9%) of the respondents identified dirty environment as the cause of Lassa fever. Majority 605 (79.1%) of the respondents agreed they know that Lassa fever can kill. Only few 20 (2.6%) of the respondents knew someone that sick of Lassa fever and they identified these people as others, this implies they might be their business partners.

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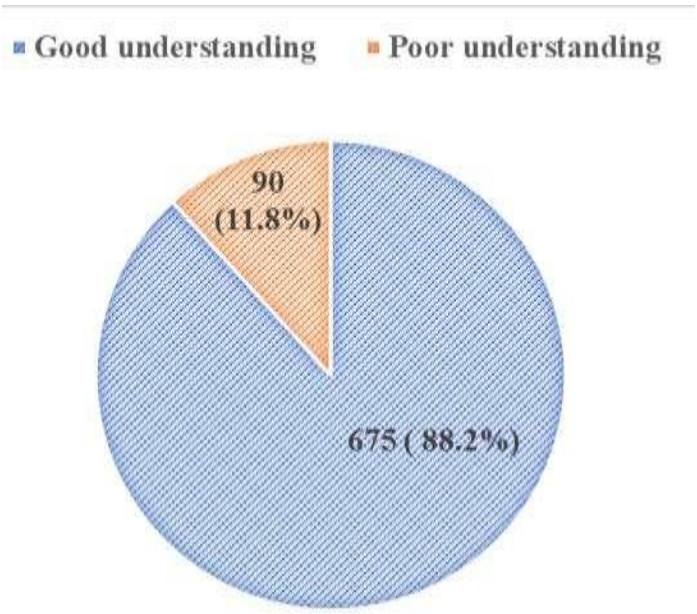

Figure 1: knowledge of Lassa fever among people in Akure South Local Government, Ondo State, Nigeria

Figure 4.1 above shows the knowledge of the respondents on what Lassa fever is. Majority 675 (88.2%) of the respondents have good understanding on Lassa fever and 90 (11.8%) of the respondents have poor understanding on Lassa fever.

Question 2: What is the attitude of people in Akure South Local Government, Ondo State, towards Lassa fever?

Table 3: Attitude of people in Akure South Local Government, Ondo State, towards Lassa fever

Variables	Number	Frequencies
If yes, have you ever tried to eradicate the rats in your home		
Yes	765	100.0%
No	0	0.0%
Do you cover your foods (both raw and cooked) at home?		
Yes	605	79.1%
No	160	20.9%
How often do you cover your food?		
anytime I remember	10	1.3%
every day	710	92.8%
only when I think rats are in the house	45	5.9%
How often do you eradicate the rats in your home		
anytime a rat is in the house	445	59.3%
Everyday	30	4.0%
once a week	115	15.3%
once a month	160	21.3%
once a year	445	59.3%
Do the rats get killed		
Yes	765	100.0%
No	0	0.0%
If yes, what range?		0.0%
all at once	80	10.5%
only a few are killed	160	20.9%
most of them are killed	525	68.6%
Do you spread your processed cassava or yam by the bush side for drying?		
Yes	570	74.5%
No	195	25.5%

Table 3 above shows all 765 (100.0%) of the respondents have made an attempt trying to eradicate the rats in their homes. Majority 605 (79.1%) of the respondents used to cover their foods (both raw and

cooked) at home. Most 710 (92.8%) of the respondents covers their foods every day, 45 (5.9%) do so only when they think rats are in the house and 10 (1.3%) used to cover their foods any time they remember. All 765 (100.0%) of the respondents eradicate the rats in their home anytime a rat is in the house. All 765 (100.0%) of the respondents agreed that the rats used to get killed. 525 (68.6%) agreed that most of the rats are killed. Also, majority 570 (74.5%) of the respondents agreed to spreading their processed cassava or yam by the bush side for drying while 195 (25.5%) disagreed.

Question 2: What are the measures adopted by Akure South Local Government, Ondo State, people in controlling Lassa fever vector?

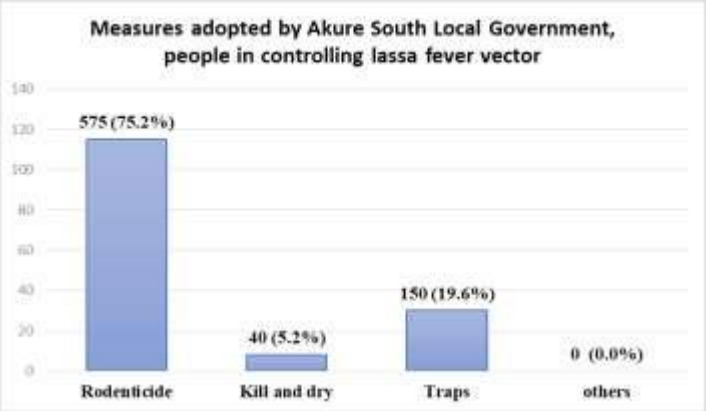

Figure 2: Measures adopted by Akure South Local Government, Ondo State, in controlling Lassa fever vector

Figure 2 above shows that **m**easures adopted by Akure South Local Government, Ondo State people in controlling Lassa fever vector. Majority 575 (75.2%) agreed to using rodenticide, 40 (5.2%) do use kill and dry. Also, 150(19.6%) do use traps as measure adopted in controlling Lassa fever vector.

DISCUSSION OF FINDINGS

A large proportion of respondents was aware of Lassa fever and knew the disease to be caused by rats. Also, a high percentage also knew it to be fatal. This is in keeping with a study on the knowledge, attitude and practice regarding Lassa fever done in 14 (53 LGAs) Nigerian states between January to March this year (2021) States include Edo, Taraba, Borno, Gombe, Yobe, Plateau, Nassarawa, Ebonyi, Ondo, Rivers, Anambra and Lagos state Kenema by Okoro (2019), which revealed a reasonable level of knowledge on Lassa fever, its mode of transmission and its seriousness. This reasonable level of awareness could be attributed to the media publicity that occurred during the recent Lassa epidemic within twelve states of Nigeria (Edo state inclusive) in February this year (2019).

This is corroborated by the fact that a larger percentage of the respondents who were aware of the Lassa fever disease claimed to have been informed by the local media (television, radio stations, and newspaper) within the state. The high percentage of those who got informed in the market can be also attributed to the massive campaign on Lassa fever done in the market few weeks earlier by the Institute of Lassa fever research and control (ILFRC).

The large number of respondents who had rats in their houses despite the high level of awareness of the Lassa vector could be ascribed to the fact that Akure South Local Government, Ondo State, Nigeria is in a favorable geographical location for rats. It may also be attributed to the gradual urbanization of the locality. This gradual urbanization of rural communities was identified by Dauda, Sodipo and Lar (2018) in the RatZooMan workshop conducted in Nigeria in 2018 as a major reason for an increased human contact with rodents. Rural practices such as deforestation, agricultural intensification and other anthropogenic changes to the environment were also said to change rodent species diversity, bringing people (or peri-domestic rodents and livestock) into contact with wild rodents. Since farming is a major occupation in Akure South Local Government, Ondo State, increased contacts with rodent through such agricultural practices noted above therefore might be accountable for the increased reported cases of Lassa fever in the planting season usually between January and March. This problem however as noted by Dauda, Sodipo and Lar (2018) is only worsened by difficulties in providing basic standards for urbanised infrastructures such as sewage, water, rubbish collection, rat-proof housing.

This high percentage of house rats despite the large proportion of those who have made attempts at rodent control in Akure South Local Government, Ondo State, affirms the symposium on the composite biology on Mastomys natalensis in West Africa CDC in 2016) which proved a near impossibility in eradicating rodents in the tropical grasslands and rainforests even with the use of highly effective rodent poisons.

Summary

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On the control of rodent vectors, most of the methods used by respondents were shown to be very effective. This is contrary to the study done between 2005 and 2006 on the ecological based and sustainable rodent control strategy in South Africa, were conventional control methods such as use of rodenticide were shown to be ineffective (Monath, 2018). This discrepancy however might be due to the use of multiple rat poisons in Akure South Local Government, Ondo State, which may prevent resistance, and the possibility that resistance is still yet to develop.

CONCLUSION

From the study, it is observed that there is high level of awareness among the respondents. Also, most of the respondents had good understanding of both the disease and its vector. Findings from the study showed that most of the respondents had rats in their homes and majority of them use kill and dry, traps, and rodenticide as the means of rodent control. Findings from this study also showed that almost all the respondents covered their foods with majority of them doing so on daily basis. It is however important to note that most of them used inappropriate means such as sack bag and net as rat can cut into them to contaminate foodstuff.

Recommendations

To the Government

- The government via the Federal Ministry of Health should continuously and intensively health educate the populace on the problems of Lassa fever, its vector control and treatment.
- There should be appropriate health education by the joint effort of both the Ministry of Health and Environment on the safe methods of rodent disposal.
- The Federal Ministry of Health should provide information via the mass media to the populace on the need to use rodent proof materials and containers as means of storage of food products.

To the Family

- Food items should be cooked before consumption, as the Lassa fever virus is known to be heat labile.
- Garri bought from the market should be heated (fried) before direct consumption.
- Each home should intensify effort at ensuring there is no rodent in the house through prevention of rodent entering (shutting of doors and windows), keeping food out of reach to rats, and use of environmental friendly rodenticide.

To the individual

- Plastic and metal containers such as aluminium pots with covers should be used for storing food items.

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