

Lassa Fever Knowledge, Perceived Hindrance to Extension Work and Prevention Advisory Practices of Agricultural Extension Services Providers in Ebonyi State, Nigeria

Abstract

This study investigates how the outbreak of Lassa Fever (LF) affects extension services delivery in Ebonyi State, Nigeria. A total of 141 Extension officers in Ebonyi Agricultural Development Programme (ADP) was interviewed using questionnaire and oral discussion. Percentages, presented to tabular forms, mean and standard deviation were used to analyze data obtained from field. The study showed that the extension officers in Ebonyi State ADP were all aware of LF menace from sources such as radio (95.7%), research institutes (100%), weekly meetings (99.2%) and many other sources. They have knowledge of the causative organism (92.1%), transmission, spread and symptoms, including the prevention. LF has effects in the work of Extension Staff such as reductions/disruptions of staff ($M=2.65$), hinders technical practice ($M=2.70$), loss of useful work hours ($M=2.63$), disruption of meeting/demonstrations ($M=2.58$) among other effects. The following prevention practices were advocated; always keep environment clean, block all rat holes, avoid contact with rats, use hand sanitizers, set traps, cover food items properly, visit to clinics if symptoms show, avoidance of rat meat, among others. To reach farmers, the extension staff used mobile phone, whatsapp calls, zoom meeting, and photos to reach farmers.

Keywords

Lassa fever, Extension Staff, Agriculture, Knowledge, Advisory Services, Rats/Rodents

Introduction

Due to its mortality rate, endemicity, and recurrent seasonal epidemics, Lassa fever continues to be a zoonotic disease that poses a threat to global health and the economy, particularly in West African nations [1]. Lassa fever was identified by the World Health Organization (WHO) in 2015 as one of the priority diseases in need of immediate research and development. Along with several other emerging viruses, it was given consideration for funding towards vaccine development by the multi-agency Coal-

Research Article

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tion for Epidemic Preparedness Innovations (CEPI) [1]. As of right now, there is no vaccine available to prevent Lassa fever infections [2].

The Lassa virus is primarily transmitted by the multimammate rat, a rodent belonging to the genus *Mastomys* that is native to most Sub-Saharan African nations [3]. The virus is inhaled and ingested through the rat's excreta, or urine and feces [4]. Additionally, the virus can be transferred from person to person through direct contact with the blood, secretions, organs, or other bodily fluids of an infected individual in a healthcare setting, within households, while caring for ill relatives, or in other settings and even in the farm where farm people and those serving the farmers, (Extension Staff) eat rats/rodents. Since it was discovered in a town in northern Nigeria in 1969, Lassa fever has been the cause of several deaths. It has led to the loss of skilled healthcare personnel in numerous health workforce cadres.

Regrettably, Inadequate Infection Prevention and Control (IPC) procedures and disregard for standard precau-

tions encourage the spread of the illness in health and non-healthcare settings. One important factor to take into account in the control of potential Lassa fever outbreaks is the adherence or non-adherence to Infection Control Practices (IPC) in several settings. Among other things, a health facility's staff's ignorance of infection control methods and the disease itself are contributing factors to acquired Lassa infection. Research supporting this claim indicates that hospitals implementing enhanced IPC procedures have very little Lassa virus transmission [5]. The 2012 Lassa fever outbreak in Nigeria claimed the lives of 70 people and left 623 cases across 19 of the 36 states in the nation.

According to [6], there are currently 51 million Nigerians thought to be at risk of contracting the infection, which could result in 3 million illnesses and 58,330 fatalities annually. According to [7], the disease first appeared in Nigeria 47 years ago. It reappeared again in the country in 2010 and claimed the lives of 17 people in Kebbi State and 22 people at Irrua Specialist Hospital in Edo State in 2012. In 2012, there was another outbreak that persisted, resulting in 1,723 cases, 112 deaths, and 201 laboratory-confirmed cases. This outbreak was observed in 23 out of 36 States in Nigeria, including the Federal Capital Territory, and 42 local government areas. Six Nigerian healthcare professionals—three physicians and three nurses—died while attending to some of the patients [8]. Among the six healthcare workers who passed away were two (2) medical doctors from Ebonyi State University Teaching Hospital (EBSUTH) Abakaliki and several farm people.

In the West African sub-region, the Lassa virus is quickly becoming known as a newly discovered nosocomial transmitted pathogen that has a major influence on public health. The primary method by which this pathogen spreads is through the hands of healthcare providers or the patients' friends or family. In light of the aforementioned, the transmission of Lassa fever in healthcare facilities represents a significant burden on the healthcare system [5,9] and raises the possibility of sporadic outbreaks in various parts of the nation. Contaminated environmental surfaces, drugs, intravenous solutions, or foodstuffs are all potential sources of infection [10,11]. The above implies that no one is exempted from the infection and attack as every sections of the economy is affected including farms where Agricultural Extension services take place.

Agricultural support services contribute to the improve-

ment of agriculture and rural development. Agricultural extension agents provide these support services, through extension means. [12] sees extension as the process of providing helpful information to individuals outside of the academic setting. Extension can also refer to the process of transmitting knowledge or information from its original source to individuals outside of it. Extension can also mean a voluntary, informal, extracurricular educational process that teaches rural farmers home management and scientific agriculture with the goal of raising their standard of living by making effective use of the resources available to them. Agricultural extension is the process of providing farmers with access to knowledge, facts, and innovations obtained in research stations or other institutions through extension workers or agents, with the goal of enhancing their farming practices. Agricultural extension, according to [13], is a system or service that helps farmers improve their farming practices through educational procedures, raising the social, economic, and educational standards of rural life, improving farming methods and techniques, and increasing production efficiency and income. Agricultural extension, she continued, is a structured, informal educational program that is typically run or sponsored by the government with the goal of raising rural residents' standard of living and productivity. in his own words.

For example, shocks such as disease outbreaks take a toll on the extension system by directly affecting personnel and their functions in the short-term. Such disruptions during the growing season may cut off information flows to farmers, resulting in reduced productivity of crop, livestock, and fish production systems [14]. In the short run, the role of extension workers is altered as focus shifts away from providing training on new technological innovations to gathering and disseminating information on the disease outbreak and its impact on the ground. Collectively, these short run changes can affect the productivity of agricultural systems, rural development programmes and result in lower food and nutrition security. There is already a wealth of evidence indicating that the epidemic has altered the farming community's fundamental makeup, which has consequences for agricultural extension services. However, the challenge that the Lassa fever epidemic is currently posing to agricultural extension organizations in sub-Saharan Africa will be quite unique and yet unknown.

Extension and Advisory Services (EAS) are crucial in pro-

viding communities and individuals with the information and tools they need to improve their quality of life. As a result, EAS are well-positioned to assist communities going through a crisis as they have supported responses to many crises in the past, such as natural disasters and epidemics like HIV/AIDS, Ebola, Avian Influenza, malaria, and, more recently, during the COVID-19 pandemic [15]. EAS also empower people, promote economic growth, foster beneficial communication, require and promote collaboration, and work to reduce poverty [16]. Agents or employees of agricultural extension provide these support services. [12] described extension as a strategy for providing helpful information to those outside of the academic setting. The act of transferring knowledge or information from the information's source to individuals outside of it is also known as extension. Extension can also be described as an informal, voluntary, after-school educational program that teaches scientific agriculture and home management to rural farmers with the goal of enhancing their standard of living via the effective use of available resources.

Ebonyi State is one of the states officially gazetted as Lassa fever endemic Areas in Nigeria. Hundreds of Ebonyians have been infected with the virus and many of them have died of it. In year (2016) alone, the Honourable Commissioner for Health, Dr. Daniel Umezurike revealed that the State recorded about 49 suspected cases confirmed out of which three later died of the dreaded disease. As a result of the preponderance of the infection, the state government adopted various measures to fight the outbreak and further spread of the disease in the state.

In such circumstances as the one under discussion, the mass media have always made a huge contribution. They are involved in spreading educative information about the sporadic outbreak of the Lassa fever disease in the state. One of the media campaigns, "Bu gunu be unu na ahu?" is now a nursery rhyme in the nooks and cranny of the state, an indication that many of the Ebonyi people might have been exposed to the radio/tv campaigns.

However, the problem of the study lies in the need to verify the knowledge of Extension Workers in Ebonyi State, of Lassa fever, its hindrance of extension work and the advisory services they give to the people to abstain from the eating of all kinds of rats as a one of the major means of preventing the spread of Lassa fever in the State. The consumption of rats has been age long habit of the majority of the Ebonyi people, particularly among those who

live the rural parts of the State, whose major occupation is farming. The specific objectives therefore are to:

- a) ascertain Extension workers' awareness of Lf;
- b) examine extension workers' knowledge of Lassa fever;
- c) determine effects of Lassa fever on extension services delivery;
- d). identify prevention advisory practices to farmers; and
- e) identify extension services delivery strategies used by extension workers during the outbreak.

Methodology

Ebonyi State Agricultural Development Program (EBADP), located in Ebonyi State, Nigeria, was the site of this study. As per [17], the region is located at latitude 6°31'N and longitude 8°15'E. Ebonyi State, Nigeria, is the study area. South East Nigeria is where the state is situated. The states of Cross River, Enugu, Benue, and Abia border it on the east, west, and north, respectively [18]. [19] estimated that the land area of Ebonyi State is approximately 5,932 square kilometers. According to [20] the state's soil is gleyic cambisol, with moderate levels of soil organic carbon (OC) on the top soil, low soil pH, and low cation exchange capacity. Savanna and semi-tropical rain forest coexist in the state's vegetation [21]. Two million, one hundred and seventy-six thousand, nine hundred and forty-seven (2,176, 947) people live in this state overall. Of those, one million are males, sixty-four thousand, one hundred and fifty-six (1,064, 156) people are female, and one million, one hundred and twelve thousand, seven hundred and ninety-one (1, 112, 791) people are female [22]. People who speak Igbo and are thought to have come from various locations within Igbo land make up the state's population. The goal of EBADP is to make farmers more aware of the application of innovations and enhance farming practices in order to boost farmers' productivity. Within the three (3) senatorial zones of the State are the three zonal offices of EBADP. The three Zones are called Ebonyi Central, Ebonyi North, and Ebonyi South. The population of extension agents in the corresponding zonal offices is recorded by EBADP (2019) as follows: Ebonyi North 55, Ebonyi Central 41 and Ebonyi South 45, making a total of one hundred and forty-one (141) EAs. The study made use of all 141 EAs across the three State zones. A structured questionnaire was used to help source the data. A 4-point Likert-

type scale of Strongly agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD) assigned scores of 4,3,2 and 1 with a 2.50-point cut-off point was used to analyze objective 3 and percentages presented in frequency tables were used to achieve objectives 1,2,4 and 5.

Results and Discussions

Agricultural Extension Officers Awareness of Lassa Fever

Table 1 showed that all (100%) extension workers were aware of Lassa fever menace in the State. They became aware through various information sources such as Ministry of Agriculture (98.5%), radio (95.7%), phone calls (92.9%), television (81.5%), churches (85.1%), research institutes (100%), monthly review meetings (99.2%), newspapers (77.3%), internet (78%), hospitals/local health center (62.4%), medical personal (55.3%), fellow extension staff (69.5%) and farmers house/farms (59.7%). These are veritable sources of agricultural/farm information through which every farmer can become aware of any outbreak. The LF menace was announced in churches after services as shown during discussion with extension staff. They were aware of LF first appearance in Nigeria in 1969 at Lassa village, Bornu State, Nigeria as evidenced by (92.9%) response.

Awareness	*Frequency	Percentage
Are you aware of Lassa Fever		
Yes	141	100
No	----	-
Please from which sources did you become aware		
Radio	135	95.7
Television	115	81.5
Church	120	85.1
Ministry of Agriculture Office	139	98.5
Research Institutes	141	100
During Monthly Meeting to Staff	140	99.2
Farmers house/farm	84	59.7
Newspaper	109	77.3
Internet	110	78.0
Phone calls	131	92.9
Hospital/Local health centers	88	62.4

Medical personal	78	55.3
Fellow extension staff	98	69.5
Do you know it was first seen in 1969 in Borno State, Nigeria		
Yes	131	92.9
No	10	7.2
* Multiple responses		

Table 1: Awareness of Lassa Fever by Extension Staff Awareness

Knowledge of Lassa Fever by Extension Workers

Table 2 revealed that the extension and advisory services providers have full knowledge LF as indicated by their responses. They know that LF is caused by a virus (92.1%), transmitted by rodents/rat (95%), it is spread by contact with rats/rodents (96.4%), physical contact with dead rat body (89.3%), contact with blood of rats/urine/faces (81.5%), contact with infected sick person (91.4%). They are aware of the following symptoms - fever (96.4%), nose bleeding (94.8%), cough (97.8%) diarrhea (90%), vomiting (95%), headache (85.8%), chest pain (80.8%), general body weakness (96.4%) and many other symptoms. LF can lead to death (99.8%), However, LF can be prevented by keeping food safe and covered (95%), avoid touching infected person (90%), regular hygiene (83.6%) and avoiding rats (97.8%).

Lassa fever has a wide range of symptoms, making it challenging for local doctors to diagnose the condition correctly, especially for those who are unfamiliar with it [22]. Before mild symptoms like low-grade fever, headache, malaise, and general weakness gradually appear, the Lassa virus incubates within infected individuals for six to twenty-one days. The majority of Lassa virus infections—about 80% of them—are subclinical and do not worsen from a mild malaise [22]. Up to 20% of infected people develop more severe symptoms (4–7 days after the mild symptoms start), including bleeding, continuous vomiting, hypotension, edema around the neck and face, respiratory distress, and hypovolemic shock. After recovering from the viral infection, normal hearing gradually returns 30-90 days after over 25% of Lassa fever cases cause some degree of deafness. Moreover, hair loss of some kind and altered gait are common in convalescing patients. Serum in the lungs and bleeding from the mouth, nose, vagina, and alimentary canal are also present in more severe cases. Additionally, there are instances of Lassa fever in which

the affected person has abnormally high protein levels in their urine [23]. After the onset of more severe symptoms, which also include seizures, tremors, disorientation, and coma, death usually results from organ failure within 10–14 days. Particularly in the third trimester of pregnancy, more than 80% of all Lassa fever cases are fatal [23].

Statement about knowledge*	Frequency	Percentage
Lassa fever is caused by these		
Virus	130	92.1
Bacteria	4	2.8
Fungus	3	2.1
protozoa	4	2.8
Lassa fever is transmitted by		
Flies	2	4.9
Mosquitoes	3	2.1
Rodents/rats	134	95.0
dogs	2	1.4
Lassa fever can spread by:		
Contact with rat/rodent	136	96.4
Contact with dead rat	126	89.3
Contact with rat blood/urine/faeces	115	81.5
Contact with infected sick person	129	91.4
Are You Aware of LF Symptoms		
General Body Weakness	136	96.4
Fever	128	90.7
Chest Pain	114	80.8
Headache	121	85.8
Sore Throat	107	75.8
Vomiting	134	95.0
Diarrhea	127	90.0
Swollen Of Face	130	92.1
Nose Bleeding	133	94.8
Cough	138	97.8
LF can lead to death	140	99.2
LF can be prevented by		
Avoiding rats	138	97.8
Avoiding touching infected person	127	90.0
Keep food covered	134	95.0
Do regular clean up	118	83.6
*Multiple response		

Table 2. Knowledge of Lassa fever

Effects of Lassa Fever on Extension Services Delivery

Table 3 indicates the various ways Lassa fever affects extension work in the study area. With a discriminating mean

index of 2.50, the following effects were noticed; reduction and disruption in staff (M=2.65), death of extension staff (M=2.57), increased organization costs (M =2.69), loss of useful work hours (M=2.63), disrupt demonstration activities (M=2.58), disrupt visit of extension staff (M=2.52), disrupt meeting times of extension staff (M=2.52).

Extension workers are not only more likely to contact because of their frequent travels to rural areas where the disease is prevalent, but they are also directly impacted by the pandemic in many other ways. Many of them suffer from chronic illnesses. Numerous coworkers have already fallen prey to the illness, and more dire news is dreaded virtually daily. In office meetings, it's more common than ever to discuss the death of coworkers. After that, they bear the intolerable cost, time, and energy burden of caring for their ailing close relatives and paying sick neighbors a visit. Certain individuals have experienced the loss of their spouses, which has left them not only bereaved but also accountable for looking after young children. Some employees have been forced to withdraw their kids from school due to the circumstances. Funeral attendance is now more common than it was in the past, and it comes with high expenses because of rituals like butchering priceless animals and feeding a sizable crowd. Lassa fever has led to a number of issues in extension organizations, including low morale, depression, economic concerns, and decreased productivity. Extension agents' productivity is impacted by their own depression and frustration, as they are trained to encourage farmers to try and adopt new agricultural technology.

Discussion with government extension service representatives reveals that Lassa fever is affecting their ability to provide adequate services. This is because their programs have been disrupted by staff absences, prolonged illness, and deaths. For instance, in Uganda, attending AIDS victims' funerals and taking care of ailing relatives causes extension workers to miss anywhere from 20 to 50 percent of their total working hours [24]. Many knowledgeable and experienced people have lost their lives to AIDS. Between 1991 and 1998, 66 employees in Zambia's Central Province passed away from HIV/AIDS-related causes; this amounted to nearly 20 percent of the employees' deaths from other causes. For numerous other provinces, the same holds true. The death of front-line staff has left a significant number of vacancies in Malawi, where there has been a moratorium on hiring since 1995 [25,26].

This has made the already inadequate ratio of extension agents to farmers worse. For instance, a Field Assistant in one district is expected to cover an area of approximately 400 square kilometers, home to 4,000 farm families. The time-consuming duties of finding, hiring, and onboarding new employees are faced by organizations, both public and private [24,25]. In addition to being psychologically depressed over losing their coworkers, the fewer employees must deal with a heavier workload as a result of the delays in replacing the sick and deceased staff members. There have been reports of higher costs associated with Lassa fever from both public and private extension organizations as well as certain pertinent institutions. The extra costs are associated with paying for sick leave and the relatives of injured employees, paying for the funerals of deceased employees, compensating early retirement, bringing on new hires and training them, and purchasing insurance. The majority of public extension departments already have extremely low operating budgets, so the additional costs will undoubtedly have an impact on their performance. The few opportunities for in-service training available to staff members will also vanish, as will the frequency of field visits.

Traveling by road through the rural regions of the most Lassa Fever -affected sub-Saharan African nations, one frequently encounters funeral scenes. Due to long-standing traditions, both men and women who should be working on their farms are now required to spend a significant amount of time attending funerals and other related ceremonies. In addition to attending these funerals in their own village, they also travel great walking distances to attend funerals in neighboring villages. This leads to a decrease in their interactions with extension agents, a reduction in their participation in technology demonstration and training programs, and a major diversion from their regular farming operations. Communication with extension staff is also being neglected, as are the farms.

Effects on Delivery	Mean	SD
Reductions and disruption in staff	2.65	0.57
Death of extension staff	2.57	0.47
Increased organization costs	2.61	0.57
Hinders technical practices	2.70	0.64
Changes in the composition of chemicals	2.65	0.62
Distractions from farm work	2.54	0.64

Increase work load on extension staff	2.69	0.72
Loss of useful work hours	2.63	0.49
Disrupts demonstration activities	2.58	0.54
Disrupt visit schedule of extension	2.67	0.63
Disrupts meeting tenders of extension staff	2.52	0.65
Accepted mean = 2.50 and above		

Table 3. Effects on Extension Service Delivery

Prevention Advice Promotion by Extension Staff

Table 4 revealed that the extension staff promoted several measures for Lassa fever prevention and control. The following Lassa fever prevention advisory messages were extended – dispose refuse regularly and properly (99.2%), environmental cleanup/sanitation (97.8%), blocking rat holes in houses (90.7%), practice standard infection prevention (90.7%), visit health facilities (95%), cover dustbins properly (85.8%), dump site be set far from communities (82.9%), safely store food items in airtight containers (87.2%), avoid drying food stuffs on the ground (84.3%), discourage bush burning (78%), the bushes serve as abodes to rodents and rats. Burning bushes will make them relocate or seek abode in the homes of people. Other prevention practices advocated includes set traps to eliminate rats/rodents in the home (87.9%), regular hand washing with soap (91.4%) in case of contact with rats or rat feces, use hand sanitizers (92.9%), avoid self-treatment/medication (87.4%), report all cases to the local clinic (82.9%), maintain high index of Lassa fever suspicion (76.5%) and diagnosis is very vital following febrile illness (91.4%).

One of the most effective strategies to stop Lassa fever from spreading throughout endemic areas is through community hygiene [23]. Humans can prevent Lassa virus infection by avoiding contact with multimammate rats in any way, especially in areas where the virus is endemic, according to the CDC [27]. In order to stop rats from reproducing in homes, it is also advised that food be kept in rodent-proof containers and that surroundings be kept tidy. This is predicted to lower the likelihood that people will contract the Lassa virus. Furthermore, eating rodents should be discouraged because the Lassa virus can infect a human during the trapping, catching, or cleaning of an infected rodent. Although placing traps to capture multimammate rats could help decrease the amount of animals that could serve as reservoirs for the Lassa virus, doing so is impractical due to the rats' dispersal throughout West

Africa [27].

Again, to stop the virus from spreading to unprotected people, some preventative measures that can be implemented include establishing biological containment conditions, isolating infected individuals, sterilizing equipment properly, and wearing protective clothing (such as masks, gloves, gowns, and goggles). Additionally, people who visit areas where Lassa fever is endemic sometimes bring the virus back to their own countries or to other countries. As soon as possible, people with fever symptoms who are returning to their home countries should be tested for Lassa fever, particularly if they have been traveling from West Africa [22]. In conclusion, it is important to educate residents of endemic regions, especially those living in rural areas, on effective ways to reduce the rodent population in order to prevent and limit the spread of Lassa fever (Tewogbola and Aung, 2020).

Infection Prevention Advice *	Frequency	Percentage
Always keep the environment clean	138	97.8
Block holes in house to prevent rat entrance	128	90.7
Cover your dustbins properly	121	85.8
Dispose refuse regularly and properly	140	99.2
Dump sites be set far from communities dwelling	117	82.9
Safely store food items in air-tight containers	123	87.2
Avoid drying food stuff on the ground outside	119	84.3
Discourage bush burning-rodent about	110	78.0
Set traps to eliminates rats/rodent in the home	124	87.9
Regular hand washing with soap	129	91.4
Use hand sanitizers when necessary	131	92.9
Visit health facilities if symptom is seen	134	95.0
Avoid self-treatment and medication	124	87.9
All cases (suspected) must be reported to local clinic	117	82.9
Maintain high index of Lassa fever suspicion	108	76.5
Diagnosis is vital following febrile illness	129	91.4
Practice standard infection prevention suggestions	128	90.7

*Multiple responses

Table 4. Prevention Advice Promoted y Extension Staff

Extension services Delivery Strategies used during Lassa fever

Lassa fever outbreak made face-face visit of extension Staff impossible. Table 5 showed the communication strategies used by the extension staff. They used mobile phones (97.8%) for services delivery, radio broadcast (91.4%), television broadcast (87.9%), whatsapp group formation (92.9%), text messaging (88.9%), zoom meeting (90.7%) and films, photo and official cameras (84.3%). Supporting the above, [28] said in China, the local extension service centers created a digitalized agricultural extension service (K) in response to the coronavirus outbreak. To lessen the negative effects of the coronavirus on extension services during the spring planting season, a big data service platform was created. Extension offered information in audio, video, text, and online document formats. The largest organizational shift for extension in Malawi was the move to online meetings. In Malawi, the usage of other internet platforms has also grown, particularly WhatsApp for group chat. Virtual agricultural fairs using Zoom and Facebook Live have been experimented with. To prevent market congestion, extension also established direct connections between farmers and purchasers. They gave farmers advice on how to focus on food crops rather than export crops and how to set aside some food for domestic consumption, as well as about impending changes in supply and demand brought on by disruptions in the supply chain [29]. Public education about the virus and its prevention was conducted in Iran through radio, television, social media, text messaging, and extension organizations.

Strategies	*Frequency	Percentage
Mobile phone use	138	97.8
Radio broadcast	129	91.4
Television broadcast	124	87.9
Whatsapp group formation	131	92.9
Text messaging	125	88.9
Zoom meeting	128	90.7
Films, photos and cameras	119	84.3
*Multiple responses		

Table 5. Extension Services Strategies Used during Lassa fever

Conclusion

The Extension workers who serve the farmers in Ebonyi State are fully aware of the Lassa fever menace. They got to know through various channels such as churches, Ministry of Agriculture, research institutes, fellow extension workers, radio and other means. They have knowledge of the causative organism, virus transmitted by the mammalian rat, when in contact or beaten, eaten, in any form. The symptoms include fever, headache, pains, sore throat, vomiting, cough, and many more. Prevention is by avoiding the eating of rats, contact with blood of rat, contact with

infected persons, regular clean up, careful storage of food among others measures. Being a health issue, LF led to the death of extension workers, disrupts demonstration activities of extension work, distraction from farm work, disrupt visit schedules and meeting times and increase organizational cost. The prevention advice promoted include environmental cleaning, blockade of rat holes, proper refuse disposal, cover food properly, avoid drying foods on bare floor among other practices. These messages were transmitted through radio, mobile phones, text messages and zoom meetings.

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