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KNOWLEDGE OF LASSA FEVER AMONG COMMUNITY EXTENSION WORKERS: CONSTRAINTS AND COST IMPLICATIONS FOR EFFECTIVE PREVENTION ADVISORY SERVICES

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ABSTRACT
All categories of Health and Social Workers (Community Health Workers, Agricultural Health Extension Workers, Rural Extension Workers among others) are essential in the fight against infectious disease world over. This study investigates Health workers' knowledge of Lassa fever disease outbreak, its effect on health and agricultural extension services delivery and prevention advisory services provided in Ebonyi State, Nigeria. A total of 141 Rural Health and Agricultural Extension officers in Ebonyi Primary Healthcare Centers and Agricultural Development Programme (ADP) were 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 both the Rural Healthcare and Agricultural Extension officers in Ebonyi State ADP and the Primary Healthcare Centres 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 Rural Health 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 rural dwellers and farmers, the Healthcare extension staff used mobile phone, whatsapp calls, zoom meeting, and photos to reach farmers. To effectively provide prevention advisory services, sufficient funding is essential. This funding allows extension personnel to connect with communities, share important information, and promote positive behavioral changes. The expenses associated with delivering these advisory services encompass costs related to personnel, logistics, training, communication materials, and operational activities.

Keywords: *Lassa Fever, Extension Staff, Agriculture, Healthcare, Rural Health, Advisory Services, Prevention Practices*

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 (Gibb *et al.,* 2017). 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 Coalition for Epidemic Preparedness Innovations (CEPI) (Gibb *et al.,* 2017). As of right now, there is no vaccine available to prevent Lassa fever infections (WHO, 2021).

The Lassa virus is primarily transmitted by the multimammate rat, a rodent belonging to the genus Mastomy that is native to most Sub-Saharan African nations (Martynov *et al.,*2022). The virus is inhaled and ingested through the rat's excreta, or urine and feces (Sf *et al.,* 2018). 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 (State, *et al.,*2018) and even in the farm where farm people and those serving the farmers, (extension staff)eatrats/rodents. Since it was discovered in a town in northern Nigeria in 1969, Lassa feverhas 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 precautions 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. (Tobin, *et al.,*2013). 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 (Ijarotimi *et al.,*2015). 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 Ogundipe (2016), 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 Yunusa and Egenti (2015), 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 (Rine and Silas 2016). 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 (Ijarotimi *et al.,* 2018; VHFC,2016) 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 (Mayank et al,.2009 Joseph *et al.,*2018). The above implies that no one is exempted from the infection and attack as every sections of the economy is affected including the ones in rural communities, known as Community Health Extension Workers, and farms where Agricultural Extension services take place. Therefore, a global health issue faces humans all over the world.

Global poor health outcomes can be partially attributed to the fact that just 25% of physicians and 38% of nurses offer care to rural communities. This issue is exacerbated in Nigeria by a significant shortage of qualified healthcare professionals (Nwankwo *et al.,* 2022). The recruitment and retention of healthcare workers in rural regions are difficult due to limited incentives, low motivation, and ineffective retention

strategies for healthcare personnel. In Nigeria, the deficiencies in medical staff, both in quantity and quality, are most apparent in the primary healthcare (PHC) sector (Federal Ministry of Health, 2018).

The Nigerian healthcare workforce includes various categories of health professionals. In rural areas, primary healthcare facilities managed by Local Government Authorities serve as the initial access point within the Nigerian health system, offering essential services to local residents. Community health workers (CHWs) make up the largest portion of healthcare personnel in these facilities. These versatile workers provide healthcare services, which cover the fundamental aspects of PHC, irrespective of patients' locations or occupations. Delivering crucial care to mothers and children in underserved regions requires immense dedication and resilience. Community health workers play a vital role in closing the healthcare gap in rural African communities, where the limited number of health professionals often restricts access to quality care and lifesaving services (Abubakar, 2021).

These categories include Community Health Officers (CHOs), Community Health Extension Workers (CHEWs), and Junior Community Health Extension Workers (JCHEWs), all of whom are recognized for enhancing rural residents' access to healthcare services, encouraging healthy lifestyles, and preventing diseases through behavioral change communication. Community health workers manage minor health issues and direct patients to the appropriate care levels when specialized treatment is necessary. Generally, they are employed by the communities they serve and have undergone less formal training compared to traditional medical professionals.

In many African communities, particularly for pregnant women, they act as the first point of medical contact. Community health workers (CHWs), also referred to as village health workers, community health promoters, and lady health workers, deliver essential public health services and basic medical care, and are typically part of the communities they serve. The World Health Organization (WHO) characterizes CHWs as health workers situated in communities (conducting outreach beyond primary health care facilities or operating at peripheral health posts lacking doctors or nurses), who may be paid or volunteers, and who are not categorized as professionals, possessing less than 2 years of training but having at least some training, even if it is just for a few hours (Cometto *et al.,* 2018; WHO, 2018). CHWs serve as a crucial link between their communities and the primary health care system. In numerous low-, middle-, and high-income countries, CHWs provide inexpensive interventions for common maternal and pediatric health issues such as pneumonia, diarrhea, undernutrition, malaria, HIV/AIDS, tuberculosis, and measles. They are also involved in responding to coronavirus disease 2019 (COVID-19). In various countries, CHWs support immunization efforts by organizing outreach services and identifying children or pregnant women who were missed during vaccination cycles. Although their roles and responsibilities may differ from one country to another, they all engage in door-to-door outreach to provide integrated community case management.

Historically, CHWs primarily engaged in programs addressing infectious diseases as well as services related to maternal and child health (Dynes *et al.,* 2013). According to research published by the PMC PubMed Central, CHWs often provided services beyond the scope defined in the National Standing Orders (National Primary Health Development Agency, 2015). This may be due to the increasing demand for specific health services in areas where professional health practitioners are scarce (Jarvis & Termini, 2012).

On the other hand, Extension professionals (EPs), also known as extension agents, function as educators within communities, assisting farmers and residents in both rural and urban locales (USDA, 2024). Typically, EPs are assigned to a specific county or a cluster of counties, delivering non-formal educational programs and activities related to agriculture, health and wellness, and the development of youth, among other areas (Israel *et al.,* 2020; NCSU, 2024). In the agricultural sector, EPs play a significant role in relaying research findings to enhance farmers' productivity and address their needs and preferences. It is estimated that globally, there are around 800,000 EPs, with more than 90% situated in developing nations (Fanzo *et al.,* 2015; Feder *et al.,* 1999; Umali and Schwartz, 1994).

The educational focus of EPs primarily encompasses four domains: (1) agriculture and natural resources, (2) youth development, (3) family and consumer sciences, and (4) community development (Washburn *et al.,* 2022). Over time, the responsibilities of EPs in communities have expanded to include disaster management and response efforts related to hurricanes, oil spills, wildfires, and zoonotic diseases. By acknowledging the interconnectedness of humans, animals, and the environment in addressing health issues, adopting a One Health approach complements the role of EPs as they bridge human healthcare, animal care, and environmental matters (WHO/TUNEP, 2024). EPs also collaborate with frontline responders to support emergency management services and public health departments in various capacities (Sampson *et al.,* 2022; Van Metre and Moerly, 2015).

The Health Extension Programme (HEP) represents a novel, community-centered healthcare delivery initiative designed to offer essential promotional and preventative health services to rural populations (WHO, 2003). Both health and agricultural extension services aim to enhance the development of rural communities and their inhabitants. These efforts can be integrated with leadership initiatives and strategic planning sessions to assist administrators and community leaders, while Health Extension Officers, or Health Extension Workers (HEWs), serve as health providers within some regions of Nigeria. They typically operate in health centers situated in rural or medically underserved regions, delivering patient care and a variety of community health services. Health extension officers are tasked with managing patient care and overseeing the administration of community healthcare services (WHO, 2007).

Rural extension has become a prevalent activity in many nations across the globe and is a fundamental component of programs and projects designed to drive changes in rural areas. The term extension can be understood as a service or system that supports farming communities through educational methods, enabling them to enhance farming practices, increase production efficiency and income, elevate their living standards, and improve social and educational conditions (Nwachukwu, 2005).

Agricultural health extension workers serve as essential community educators who connect farmers with researchers, offering practical training on modern techniques, sustainable farming practices, pest management, soil health, and how to access resources like credit and markets to enhance agricultural productivity, well-being, and rural advancement. They engage in house-to-house interactions to instruct, demonstrate, and educate families, creating role models that align with the health extension program for community dissemination. Health extension workers deliver services at Health Posts and within the community. In addition, they are responsible for ensuring safe and clean deliveries, managing hemorrhage, preventing infections, recognizing issues and complications early on, and making referrals to appropriate health service levels. Health extension workers provide supportive supervision to traditional birth attendants and community health workers as well (Assfaw, 2010; Desta *et al.,* 2012; Berhe and Berhane, 2014).

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(Babu, 2020). 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 providing 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 (DLEC Project, 2020). EAS also empower people, promote economic growth, foster beneficial communication, require and promote collaboration, and work to reduce poverty (GFRAS, 2019). Agents or employees of agricultural extension provide these support services.

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 Rural Health and Agricultural 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 Community and Agricultural Health Extension workers' awareness of Lf;
b) examine Comminity and Agricultural Health extension workers' knowledge of Lassa fever;
c) determine effects of Lassa fever on health and agricultural extension services delivery;
d). identify prevention advisory practices to farmers; and
e) identify rural health extension services delivery strategies used by rural health extension workers during the outbreak.
f) estimate the cost components of extension prevention advisory services delivery in the area.

MATERIALS AND METHODS

Ebonyi State Primary Healthcare Centre and the Agricultural Development Program (EBADP), located in Abakaliki, Ebonyi State, Nigeria, was the site of this study. As per EBADEP (2019), the region is located at latitude 6031°N and longitude 8015°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 (Ebonyi State Diaries, 2013). Ezeh and Eze (2016) estimated that the land area of Ebonyi State is approximately 5,932 square kilometers. According to Nwite *et al.,* (2012) the state's soil is gleyic cambisol, with moderate levels of soil organic carbon (OC) on the top soil, low soil pH, and low cat ion exchange capacity. Savanna and semi-tropical rain forest coexist in the state's vegetation (Ezeh and Eze, 2016). Two million, one hundred and seventy-six thousand, nine hundred and forty-seven (2,176, 947) people live in this state overall(NPC, 2006). The population of rural health extension agents (HEAs) 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) officers. Descriptive tools such as the use of frequencies, percentages, **Cost Analysis Technique**; Cost analysis helps to determine the financial requirements for implementing prevention advisory services, **Budgetary Analysis**; Budgeting techniques are used to estimate total project cost and determine the distribution of funds among different cost components. **Mean Cost Analysis;** The mean cost helps determine the average cost per extension staff involved in the programme were all used. 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, 5 and 6. They are represented mathematically thus;

Total Cost (TC)

$$TC=\sum(UC\times Q)$$

Where:
TC = Total Cost
UC = Unit Cost
Q = Quantity (Number of extension staff)

Mean Cost per Extension Staff

$$MC=TCN$$

Where:
MC = Mean Cost per staff
TC = Total Cost
N = Number of extension staff (141)

Percentage Cost Contribution

$$PC=CCTC\times 100$$

Where:
PC = Percentage Contribution
CC = Component Cost
TC = Total Cost

RESULTS AND DISCUSSION

Table 1: Awareness of Lassa Fever by Healthcare Extension Staff Awareness

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 Agricultures Office	139	98.5
Ministry of Health	141	100
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 personel	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 2: Knowledge of Lassa fever by the Rural Health and Extension Workers

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 3: Effects on Lassa fever Disease on Health Extension Service Delivery

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 and field 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 4: Prevention Advice Promoted by Community Agric. Health Extension Staff

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 5: Extension Services Strategies Used during Lassa fever

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*

Results

Tables 1 and 2 indicate the respondents are fully aware of Lassa fever menace having known the symptoms and as such have good knowledge of the disease. Tables 3 and 4 showed the effects of lassa fever outbreak on delivery of Extension Services to farmers, and the prevention strategies advocated. Table 5 revealed the media tools used for information delivery for better work productivity**,** while table 6 discussed the cost implication of extension and advisory services delivery during the period of Lassa Fever outbreak.

Discussion

Rural Healthcare and Agricultural Extension Officers Awareness of Lassa Fever

Table 1 showed that all (100%) the community agricultural health 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%), Ministry of Health (100%), 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.

Table 6: Estimated Cost Components for Effective Prevention Advisory Services (n = 141)

S/N	Cost Component	Unit Cost (₦)	Quantity	Total Cost (₦)
1	Training of extension staff	50,000	141	7,050,000
2	Transportation and field mobility	30,000	141	4,230,000
3	Information and communication materials	10,000	141	1,410,000
4	Protective materials (gloves, sanitizers, etc.)	8,000	141	1,128,000
5	Monthly field allowance	25,000	141	3,525,000
6	Monitoring and supervision	15,000	141	2,115,000
7	Community sensitization programmes	20,000	141	2,820,000
8	Administrative and logistics cost	12,000	141	1,692,000
Total				**23,970,000**

Knowledge of Lassa Fever by Health 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%).

Additionally, there are instances of Lassa fever in which the affected person has abnormally high protein levels in their urine (WHO, 2017). 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 (WHO, 2017)

Effects of Lassa Fever On Rural Healthcare Extension Services Delivery

Table 3 indicates the various ways Lassa fever affects rural health 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. During oral discussions, it was observed that 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 (Qamar, 2003; Rivera *et al.,* 2001). 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(Qamar, 2003, 2000). 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 on boarding new employees are faced by organizations, both public and private (Qamar, 2003; FAO, 2001). 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.

Prevention Advice Promotion by Rural Health 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 (WHO, 2017). 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 (CDCP, 2015). 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 (CDCP,2015).

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 (WHO, 2017). 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).

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, Headey *et al.,* (2020) said inn 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(Telg *et al.,*2008). Public education about the virus and its prevention was conducted in Iran through radio, television, social media, text messaging, and extension organizations.

Estimated Cost Components for Effective Prevention Advisory Services

Table 6 outlines the projected cost elements necessary for implementing effective prevention advisory services with the support of 141 extension staff members. The total investment required for this program amounts to ₦23,970,000, which is essential for enabling extension staff to deliver prevention advisory services effectively in rural areas. The data indicates that training for extension staff represents the largest expense at ₦7,050,000. This training is crucial, as it ensures that extension personnel acquire the knowledge and skills needed to effectively communicate prevention information to rural households. The World Health Organization (2020), highlights that enhancing the capabilities of community health and extension workers significantly boosts disease prevention efforts in rural communities. Transportation and field mobility costs account for ₦4,230,000, making it the second largest expense. This illustrates the vital role of mobility in extension work, as personnel frequently travel to rural areas for advisory services, demonstrations, and monitoring preventive practices. In many developing nations, inadequate transportation infrastructure raises the costs of field mobility for extension workers. Additionally, field allowances, totaling ₦3,525,000, represent another significant cost component. These allowances incentivize extension workers to perform their duties effectively, particularly in remote areas with challenging conditions. Sufficient motivation has been recognized as a crucial element impacting the performance of extension staff in community development init Community sensitization initiatives generated a total cost of ₦2,820,000. This amount covers various activities such as village meetings, awareness campaigns, and training sessions aimed at educating community members about preventive health measures. These effective sensitization efforts are crucial in raising public awareness and fostering changes in behavior that lead to disease prevention. The costs associated with monitoring and supervision reached ₦2,115,000. This monitoring is essential for ensuring that extension staff implement prevention advisory activities in line with program goals. Moreover, it enables supervisors to evaluate the program's impact and pinpoint areas that need improvement. Administrative and logistics expenses totaled ₦1,692,000, and the costs for information and communication materials were ₦1,410,000. This latter figure includes posters, leaflets, manuals, and other educational tools used during community training events. Such communication materials are critical for enhancing the dissemination of knowledge and boosting the effectiveness of prevention advisory services. The category with the lowest expense was protective materials, which cost ₦1,128,000. These items, including gloves, sanitizers, and safety gear, are essential for ensuring the safety of extension staff while they engage with the community. Although this category has the least financial requirement, it is still vital for safeguarding workers in the field. Thus, it is crucial for policymakers and development agencies to allocate the necessary resources to strengthen extension systems focused on disease prevention and community health initiatives. Developing sustainable financing strategies will empower extension workers to provide effective advisory services and enhance the overall health and well-being of rural populations.

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 public 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. Overall, the cost analysis indicates that the primary financial drivers behind prevention advisory services are human capacity development, mobility, and motivation. These insights align with previous research that highlights the necessity of sufficient funding for extension programs to achieve effective public health outcomes. Inadequate financial resources can hinder extension staff's ability to reach rural communities and deliver preventive advisory services effectively

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