



LASSA Fever: A 1400% Fold Increase in Infection Rate among Health Care Workers in Nigeria-a Cause for Concern and a Comparative Analysis of NCDC 2021 and 2022 Situation Reports

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Authors' contributions

This work was carried out in collaboration between both authors. Both authors read and approved the final manuscript.

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ABSTRACT

Background: Lassa fever is an acute viral haemorrhagic illness {fever} caused by Lassa virus, which is hosted by rodents in the *Mastomys natalensis* species. It is found in abundance in West, East, and Central Africa. Lassa fever is caused by an *arenavirus*, which is a *single-stranded, bisegmented RNA virus* that is enclosed. Lassa fever was originally documented in 1969 in the Borno State town of Lassa in Nigeria, when two missionary nurses died of the sickness. Unfortunately, despite the fact that the first case was recorded 53 years ago, hundreds of thousands of cases are reported each year without proper epidemic preparedness and prevention strategies.

Objectives: The study's goal is to characterize the different percentage increases in the various Lassa fever report indicators as reported by the Nigeria Centre for Disease Control (NCDC), with the goal of giving a comparative analysis of the Lassa fever report in 2021 and 2022 using the 7th week epidemiological report of 2021 and 2022.

Methods: Data and information for this article was obtained in Nigeria Centre for Disease Control

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(NCDC) 7th week epidemiological situation report of 2022.

Results: A comparison of the Lassa fever situation report for week 7 epidemiology report for 2021 and 2022 revealed a 1400 percent rise in the infection rate in health care workers in 2022 compared to the previous year, 2021. Other report indicators (suspected/confirmed cases, state and local government involvement, etc.) increased by more than 100 percent in the 2022 report compared to the 2021 report.

Conclusion: This comparative analysis has revealed the lack of an epidemic preparation strategy for such an annual epidemic, which is eye-opening for all health care workers, administrators, and governments. As a result, establishing an emergency preparation strategy and implementing several prevention strategies (deratization, health-care training, community sensitization etc) that can lead to a reduction in the number of cases and deaths each year is critical.

Keywords: Lassa fever; comparative; NCDC; health care workers.

1. INTRODUCTION

Lassa fever (LF) is a zoonotic illness that spreads over West Africa and is transmitted from animal to human and human to human. Human-to-human transmission occurs when a person comes into contact with a rodent's excreta and secretions, such as urine and saliva, while animal-to-human transmission happens when a person comes into contact with an infected person's bodily fluids. The number of cases recorded each year is around a thousand, with a few hundred deaths, and one-third of patients have serious post-infection sequelae (e.g., lifelong deafness) [1]. As a result, Lassa fever is recognized as a severe public health risk that demands further research into its pathogenicity and potential prevention.

It is mainly a disease of the developing world, however, several imported cases with hazardous outcomes have been reported in different parts of the world including North America [2-4], Europe [5-7] and Asia [8,9] etc. LF virus was first discovered in 1969, but its presence can be traced back for centuries [10]. Current viral hotspots are focused on West African countries, namely, Nigeria, Guinea, Benin, Sierra Leone and Liberia. Growing human population, urbanization and global warming increase the chance of human interaction with wildlife, resulting in elevated risk of its overall transmission [11].

1.1 Epidemiology

It is an acute haemorrhagic viral infection, caused by an enveloped, single-stranded RNA virus of the Arenaviridae family with a clear zoonotic origin [11–12]. It is prevalent in the West African sub-region where about 3-5 million individuals are infected yearly [13]. The animal

reservoir of the virus is *Mastomys natalensis*, also known as multimammate mouse, which is a rodent specie that is widespread in developing countries. This virulent rodent has an average life span of 2 years, breeds round the year with each pregnancy resulting in 16-20 litters [14]. The main feature of fatal illness is impaired or delayed cellular immunity leading to fulminant viraemia [15]. It is speculated that at least 10,000 people die of Lassa fever in West Africa annually [16].

Dissemination of the infection can be assessed by prevalence of antibodies to the virus in populations. The prevalence of antibodies to the virus is 8-52% in Sierra Leone, 4-55% in Guinea [17], and in Nigeria [18].

Lassa fever affects people of all ages. The disease is mild or has no observable symptoms in about 80% of people infected, but 20% have a severe multisystem disease. The following are some of the most common Lassa fever symptoms: overall weakness, sore throat with (white exudative patches), fever, headache, chest, side, or stomach discomfort, conjunctivitis, nausea and vomiting, and diarrhea, facial swelling with bleeding from bodily orifices [16-19]. Given the clinical similarities between malaria and other fever-causing illnesses, a strong index of suspicion is required for diagnosis. Incubation period is 6-21 days.

The virus is excreted in urine for three to nine weeks from infection and in semen for three month [19]. Presentation of cases used to be highest during the dry season (January to March) and lowest during the wet season (May to November). However, recent data from Kenema, Sierra Leone show that admissions were highest during the change from the dry to the wet season [20]. During pregnancy, high rate of maternal

death (29%) and fatal and neonatal loss (87%) have been recorded, with 20% of all maternal deaths in Sierra Leone being due to Lassa fever [21].

Lassa fever virus has the greatest public health implication of all the arenaviridae; and control of the mastomys rodent population is impractical, so measures are limited to keeping rodent out of homes and food supplies, as well as maintaining effective personal hygiene. Gloves, face masks, laboratory coats, and goggles are advised while in contact with an infected person.

Vaccine against Lassa fever is currently unavailable, though development is underway. The Mozambique virus closely resembles Lassa fever virus but lacks its deadly effects. This virus is being considered for possible use as vaccine. Researchers at the USAMRIID facility have a promising vaccine against Lassa virus based on recombination vesicular stomatitis virus vectors expressing the Lassa virus glycoprotein. After a single intramuscular injection, test primates have survived lethal changes, while showing no clinical symptoms [22].

2. MATERIALS AND METHODS

The information came from the NCDC's Lassa fever epidemiological situation report for 2022. The Lassa fever situation report in 2021 and 2022 was compared using the 7th week report as a baseline.

Number of suspected/confirmed cases, number of infected health-care professionals, local government areas (LGAs) and states involved, and death reported as of the 7th epidemiological week for 2021 and 2022 were the report indicators for comparison.

The information was then presented in appropriate graphs using the data that had been entered into an excel sheet.

3. RESULTS AND DISCUSSIONS

3.1 Comparative Analysis of 2021 and 2022 Lassa Fever Situation Report

According to the NCDC's 7th week Lassa fever epidemiological report in 2022, there are 1995 suspected cases, 450 confirmed cases, 19 probable cases, 86 deaths, and the disease has spread to 21 states and 74 local government areas. The aforementioned report was a matter

for considerable concern, given the statistics from the same period in 2021, where there were 817 suspected cases, 102 confirmed cases, two probable cases, and 28 deaths reported, with cases spanning only eight states and 32 LGAs [23].

3.2 Let's Make a Comparison (Comparative Analysis) with the Year 2021

There were 102 confirmed cases and 817 suspected cases reported in the seventh week of 2021, compared to 450 confirmed cases and 1995 suspected cases in the same week in 2022. This represents a 340 percent and nearly 150 percent increase in confirmed and suspected cases, respectively. In terms of mortality (28:86), there was a 200 percent increase in the number of deaths, while the case fatality rate in 2021 was 27.5 percent, up from 19.1 percent in 2022 [23].

Similarly, to assess the extent of transmission and infection of health care workers across the Nigerian health care system, a comparison of the number of infected health care employees in twenty-twenty-one and twenty-twenty-two was conducted. According to the report, 30 health-care staff were infected with Lassa fever during the 7th week of the same period in both years, compared to only 2 infection reports among health-care workers in 2021. The geometric growth in the number of infected health-care professionals merely indicates that the degree of infection in 2022 increased by 1400 percent. This is particularly concerning given the year-to-date exponential spike in infection rates. As of the end of February and beginning of March 2022, roughly 5 health care professionals have died, corresponding to a case fatality rate of approximately 13% [24-26].

Fig. 2 depicts the overall increase in indicators for the Lassa fever situation report as captured in the preceding discussions, whereas figure 3 simply summarizes the fact that when comparing the 2021 and 2021 Lassa fever situation reports, there was a 100 percent increase in the number of suspected/confirmed cases, deaths, and infection spread in states and LGAs.

This rise in the number of cases basically means that the risk of infection among health-care workers will rise, particularly in facilities lacking in strong infection-control practices. This can simply be reinforced by the fact that there were decreases in instances in 2021 [23], most likely

due to the fear of COVID-19. As a result, the level of adherence to conventional precautions rises, resulting in fewer occurrences recorded in 2021. With the easing of lockdowns, as well as apathy for infection control methods and pandemic fatigue, it's not a surprise that the number of Lassa fever cases has risen dramatically. Another major contributor to the increase in Lassa fever cases and deaths may be the aforementioned statement, as well as overall sloppiness, following initial intensified adherence to standard precaution practices during the fearful period of peak COVID-19 pandemic in community and health care settings [27-29].

This comparison highlights the clear gaps in infection preparedness in our society, particularly in developing countries, where more emphasis is placed on treatment rather than large-scale

campaigns and the implementation of prevention and control strategies that could mitigate or prevent the occurrence of massive epidemics. If the lessons learned from this article and the comparative analysis are not prioritized in the assessment of health-care budgets, it is unavoidable that the annual growth of Lassa fever will reach a worrisome level, overwhelming already overburdened health-care workers and resources.

In light of the foregoing, the NCDC, as well as other concerned authorities such as the WHO and partners, must develop line programs aimed at lowering the annual occurrence of Lassa fever. If not, Lassa virus outbreaks in following years may reach cataclysmic proportions, putting a strain on the health-care system's already stretched resources.

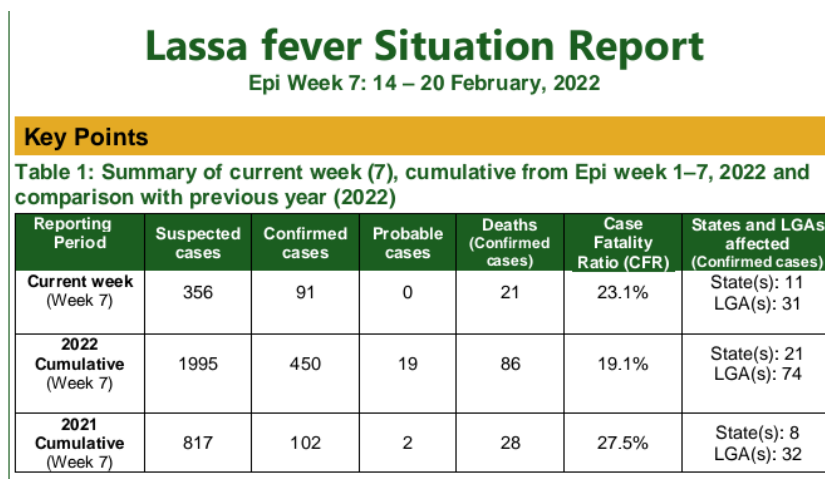


Fig. 1. Lassa fever situation report
Source: NCDC

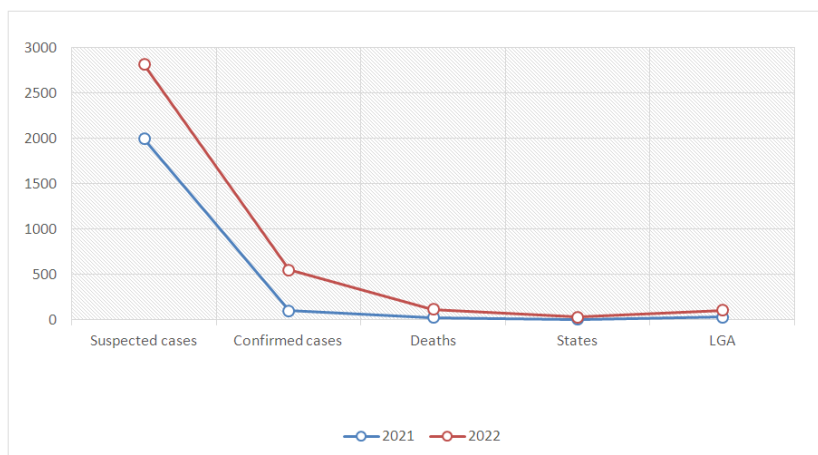


Fig. 2. Lassa fever situation report comparison for 2021 and 2022

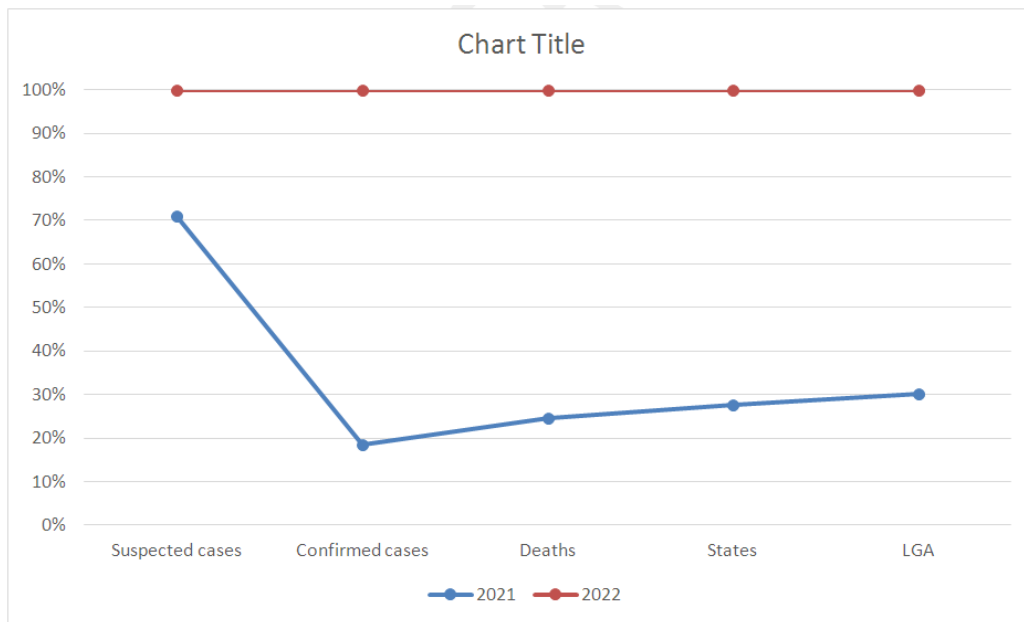


Fig. 3. Summary indices of Lassa fever situation report, 2021 and 2022

4. CONCLUSION

In comparison to the previous year, the comparative analysis shows a rise in infection among health care personnel of over 1,000 percent in 2022. Similarly, all indicators for the Lassa fever report (suspected/confirmed cases, deaths, infection rate of health care staff, and so on) surged by over 100 percent. This article has highlighted the country's lack of infection disease emergency preparedness as well as the inefficient execution of preventive strategies. As a result, all concerned authorities should take steps to make the creation of a strong infectious disease emergency preparation strategy easier in the future.

Additionally, adequate resources must be provided for the concerned institution to work with the World Health Organization and other relevant bodies to ensure that all Lassa fever prevention strategies (deratization, good waste management practices, community sensitization and awareness, and health care worker training) are implemented, particularly prior to the outbreak's peak season. Importantly, Lassa fever prevention must be prioritized in the same way as COVID-19 prevention was prioritized by the world and Nigeria. That is to say, if the same attention paid to COVID-19 prevention is given to Lassa fever control, the incidence of Lassa fever would have been drastically reduced or eliminated by now.

5. RECOMMENDATIONS

The major recommendation includes:

1. At least bi-annual deratization of Nigerian communities, particularly in states where Lassa disease is endemic.
2. The NCDC must oversee quarterly community sensitization and campaigns on Lassa fever prevention and control (with a focus on community involvement and ownership).
3. Launching of operation kill the rats in homes and these should be done at least every quarter
4. There should be a massive grassroots mobilization of community leaders, who must be commissioned as ambassadors for Lassa fever control
5. A law must be enacted that regulates bush burning and waste management practices
6. Health care workers must be trained regularly on Lassa fever control and adherence to standard precautions
7. The federal ministry of health must set up committee that will ensure the presence of functional infection prevention and control committee in all health care settings.
8. All states of the federation must establish a functional emergency preparedness committee whose main task is to create infectious disease emergency

preparedness plans and sound response measures.

9. All efforts must be taken to ensure that the correct vaccine for Lassa fever is created, which can be accomplished if sufficient resources are allocated to this worthwhile endeavor.
10. More diagnostic and treatment centers are needed to relieve the strain on the few Lassa fever centers. The goal is to achieve early diagnosis and treatment, which will help to lower the high fatality rate associated with Lassa fever.
11. There is need to establish more PCR laboratories in Nigeria especially in rural areas that are highly endemic for Lassa fever
12. The WHO and NCDC should create a checklist with a grading system based on a literature review that can be utilized in rural areas and health care facilities without PCR machines to facilitate early detection and referral of suspected Lassa fever cases for diagnosis and treatment. As a result, this could help to reduce the mortality and late presentation that most Lassa fever cases have. A LASSA HIGH INDEX SUSPICION CHECKLIST AND GUIDE might be a better name for this (Check appendix one for a checklist prototype designed by the correspondent authors based on review of literatures) [1,2,4,5,16-23-29].

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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APPENDIX ONE: PATIENT LASSA FEVER ASSESSMENT CHECKLIST AND GUIDE

History	Score	Comments
1. FEVER(>38°C)	1	
2. History of FEVER unresponsive to antimalarial and antibiotics	2	
3. History of contact with person with FEVER unresponsive to antimalarial and antibiotics	2	
4. Sore throat	2	
5. Sore throat with white exudative patches(very common)	3	
6. Pain in the chest and Abdomen	1	
7. General weakness and malaise	1	
8. Headache with or without conjunctivitis	1	
9. Swelling of the face or neck	3	
10. Mucosal bleeding (mouth, nose, eyes) or Internal bleeding	4	

TOTAL SCORE IS 20

A score of less than 3- Less suspicion: 3-5- Mild level of suspicion

5-10- Moderate level of suspicion: >10- HIGHLY SUSPICION

OR

Any patient with history fever or sore throat and mucosal or body opening bleeding is classified as HIGHLY SUSPICION

All cases of suspicion by must be reviewed by the doctor, while MODERATE TO HIGH CLINICAL SUSPICION must be referred to public health physician for further assessment and actions.

NB: This checklist was conceptualized and design by corresponding author.

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