

## Lassa fever outbreak in Newaken Community, Grand Kru County, Liberia, September-October 2017

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### ABSTRACT

**Introduction:** Lassa fever (LF) is an acute viral hemorrhagic febrile disease spread by infected multi-mammate rats and from person-to-person by direct contact with infected body fluids. On 4th October 2017, the surveillance focal person of Newaken clinic reported to the surveillance focal person of Grand Kru County a suspected case of LF, who had presented with fever, headache, vomiting blood, and weakness. We investigated to confirm the outbreak, determine its scope, establish its source, and implement evidence-based control and prevention measures. **Methods:** We defined a suspected case as any person with an acute onset of fever ( $\geq 38^\circ$  Celsius) and two or more of the following symptoms: bleeding, headache, vomiting, diarrhea, muscle weakness, and chest pain, who lived in Newaken Community from September 14, 2017 to October 25, 2017. A probable case as anyone who was epidemiological linked to a confirmed case, within 21 days of onset of symptoms while a confirmed case was either a suspected or probable case who was laboratory confirmed (positive IgM antibody, PCR or virus isolation). A contact was defined as anyone who associated with the confirmed case either by providing therapeutic care or living in the same household. We reviewed medical records, interviewed family, and community members to identify cases and contacts. We conducted active case search in the affected community to identify cases and contacts. We followed and monitored the contacts for 21 days. **Results:** We identified one confirmed case of LF, an 11-year old boy, whose onset of illness started with fever, cough, vomiting blood, and body weakness three days after he returned from Cote d'Ivoire where he had been residing for the past two years. He was isolated at hospital A. He was managed using anti-pyretic drugs and anti-viral drug (Ribavirin). Patient recovered after 30 days of intensive management. No other case was identified among the 21 contacts. The case-patient's resident community in Liberia was fond of storing food without covering it and also consuming bush meat. There was no documented LF outbreak in the Cote d'Ivoire community where the case-patient was residing before coming back to Liberia. **Conclusion:** This was LF outbreak whose source could not be established and no spread occurred among the human population beyond the index case. It was controlled by effective management and public education about infection prevention and the outbreak was declared over on the 25th of October 2017.

**KEYWORDS:** Lassa Fever, Outbreak, Liberia

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## Introduction

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Lassa fever (LF) is an acute viral haemorrhagic illness caused by Lassa virus (LASV), a member of the arenavirus family of viruses. Lassa fever is considered a disease with high epidemic potential and one of the coalitions for epidemic preparedness innovation [1].

Humans usually become infected with LASV through exposure to food or household items contaminated with urine or faeces of infected *Mastomys* rats [2]. The disease is endemic in the rodent population in parts of West Africa. Person-to-person transmission occurs particularly in health care settings in the absence of adequate infection prevention and control measures. The incubation period of LF range from 6-21 days [3].

The disease is endemic in West Africa especially in Guinea, Liberia, Nigeria, and Sierra Leone [4]. Lassa fever affects approximately 300,000 to 500,000 people and 5,000 deaths are reported every year in West Africa. Lassa fever is one of the immediately reportable diseases in Liberia with an epidemic threshold of one confirmed case considered as an outbreak [5].

In Liberia, LF is endemic in the middle region of Liberia, specifically in Bong, Nimba, Lofa, and Grand Bassa Counties [6]. Lassa fever is described as endemic in these portions of Liberia because outbreaks of LF occurred every year in these counties [7,8]. In 2017, Liberia reported 78 suspected cases of LF from 7 counties, 30 of these cases were confirmed and 12 deaths were reported (CFR 40%) [9]. Grand Bassa County reported the highest number of confirmed cases of LF in 2017 followed by Nimba, and Bong Counties. Few cases were reported from Lofa and Montserrado Counties, and 1 confirmed case was reported from Grand Kru County [10]. Grand Kru County is in the south-eastern part of Liberia and is not in the LF endemic region of Liberia [Figure 1](#). On the 4th of October 2017, Newaken clinic surveillance focal person informed the surveillance focal person of Grand Kru County of a suspected case of LF, who presented with fever, headache, vomiting blood, and weakness. We investigated to confirm the outbreak, determine the scope of the outbreak, establish the

source of the outbreak, and implement evidence-based control and prevention measures.

## Methods

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### Outbreak area

The outbreak occurred in Newaken Community, a small town in Grand Kru County, with less than 100 households and an estimated population of 2,814 inhabitants. The town is situated along the main road and partially surrounded by forest. The major occupations of its residents are mainly farming and mining activities.

### Case definition and findings

We defined a suspected case as any person with an acute onset of fever ( $\geq 38^{\circ}\text{C}$ ) and two or more of the following symptoms: bleeding, headache, vomiting, diarrhea, muscle weakness, and chest pain, who lived in Newaken Community from September 14, 2017 to October 25, 2017. A probable case was defined as anyone who was epidemiologically linked to a confirmed case within 21 days of onset of symptoms while a confirmed case was defined as either a suspected or probable case who was laboratory confirmed (positive IgM antibody, PCR or virus isolation). A contact was defined as anyone who associated with the confirmed case either by providing therapeutic care or living in the same household.

We reviewed medical records of the patient at Newaken Clinic and Rally Time Hospital, held interviews with healthcare workers, family, and community members to identify additional cases and contacts. We conducted active case search in the affected community to identify cases. We followed and monitored contacts for 21 days. We conducted cross-border surveillance and shared information about the case-patient with our Cote d'Ivoire counterparts where the patient was residing before traveling to Liberia.

### Environmental assessment

We assessed the community for the availability of improper dumping sites and bushes where rodents often harbor. Systematically, house-to-house survey

was conducted using simple questionnaire to ask community dwellers on their food storage, the source of drinking water, and consumption of rodents.

### **Laboratory investigations**

Whole blood specimen was collected from the suspected case and transported to the National Reference Laboratory (NRL). Specimen was tested using the real time polymerase chain reaction (RT-PCR) to confirm presence of the causative agent. At the same time, specimen of the patient was also tested at Rally Time Hospital to determine the hemoglobin (Hgb) level of the patient.

### **Availability of data and material**

The data upon which this write up is based belong to the Ministry of Health Liberia and are not publicly available. However, the data could be availed from the corresponding author with reasonable request and with permission from the Ministry of Health, Liberia.

### **Ethics approval and consent to participate**

This was a public health emergency. The National Public Health Institute of Liberia and the Ministry of Health, Liberia gave the directive to the County and District Surveillance Officer to have all emergency situations and events investigated within twenty-four hours as part of the response. Community members, contacts, and patient's family members were educated and informed about the investigation and verbal consents were granted for the investigation.

## **Results**

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### **Case Description**

We identified one case of LF, the first in Grand Kru County, an 11-year old boy who had been residing in Cote d'Ivoire with his father for the past two years. On the 1st of October 2017, he travelled to Newaken Community, Grand Kru County, Liberia to live with his mother. Three days after his arrival in Newaken Community, he felt ill and he was taken to Newaken Clinic. He presented with fever, diarrhea, cough, vomiting blood, and weakness. He was later referred to Rally Time Hospital where he

was isolated and blood sample was carefully obtained in adherence to infection prevention and control (IPC) measures and transported to the National Reference Laboratory for confirmation. Results from Rally Time Hospital laboratory revealed that the patient hemoglobin level was low (3.6mg/100dl). The patient was transfused with two units of blood (PRBC) at the isolation unit of Rally Time Hospital and received symptomatic treatment while awaiting the results from the National Reference Laboratory.

On the 11th of October 2017, the National Reference Laboratory released the patient results through the National Public Health Institute of Liberia (NPHIL) indicating that the patient was positive for Lassa fever by Reverse transcription polymerase chain reaction (RT-PCR) testing.

### **Case management**

In addition to symptomatic treatment, specific treatments administered were anti-pyretic drugs (Diclofenac injectable and oral Acetaminophen) and antiviral drug (Ribavirin). Supportive care such as: feeding, bathing, and encouraging bed rest was provided daily. The patient became stable and regained his health after 30 days of intensive management and he was finally discharged on the 3rd of November 2017.

### **Contact tracing findings**

We line-listed 21 contacts, of which 47.6% (10/21) were family members residing in the same community with the confirmed case (Newaken Community) and 53.4% (11/21), were healthcare workers from Newaken Clinic and Rally Time Hospital. None of the contacts presented with symptoms of the disease during the 21 days of follow up and monitoring.

### **Environmental assessment findings**

Environmental assessment revealed the presence of improper dumping sites and bushes in the community. Some of the community dwellers including relatives of the confirmed case stored dry food in open kitchen and outside of their homes while others stored their dry food on the farms.

Rodents such as bush rats were consumed by some community dwellers especially those involved in hunting and farming activities. Cross-border investigations also revealed that there have been no outbreaks of Lassa fever in Cote d'Ivoire or in the community where the case-patient was staying and there was no evidence of the patient contracting the disease from Cote d'Ivoire.

## Discussion

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This was a confirmed LF outbreak. It was the first confirmed LF outbreak in Newaken Community involving a child who presented with fever, cough, vomiting blood and weakness. The child might have probably consumed food or drink contaminated with rodent feces or urine as a result of poor storage of food and drinking water in Newaken community, Grand Kru County, Liberia. Many community members including relatives of the case-patient stored their dry food and drinking water in open kitchen outside of their homes while others stored their dry food on their farms.

Despite continual health education on the prevention of LF, some community dwellers are still in the habit of butchering and consuming rats which is highly contagious and has the potential of humans easily contracting the disease. Environmental assessment revealed poor sanitary practices which likely exposed the community to lots of dumping sites without proper sanitary measures put in place. Similar to these findings, poor sanitary practices and improper storage of dry food have caused outbreaks of LF in rural parts of Guinea and Sierra Leone in 2017 [4]. While in Nigeria, outbreaks of LF that occurred in the past three years has been linked with the consumption of rodents by local farmers especially in rural areas [6].

Due to early detection, contact tracing, and closed monitoring, there was no spread of the disease among the human population. The one confirmed case successfully recovered from the disease after one month of intensive care and treatment at the isolation unit of the hospital.

## Limitations

Although identification of the source of the outbreak would be key to the response and future prevention

efforts, we could not do so. Our investigation revealed that the case-patient had been residing in Cote d'Ivoire where there was no documented LF outbreak. Our efforts to identify the source of the outbreak were further affected by weaknesses in cross-border responses and collaborations during public health emergencies between Liberia and Cote d'Ivoire. Additionally, we were also limited by logistical support to reach Cote d'Ivoire.

## Conclusion

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In conclusion, this was the first confirmed Lassa fever outbreak in the history of Grand Kru County. Although many contacts were line listed but only one case was identified during the outbreak. There was no spread among the human population beyond the index case and no death. The outbreak was controlled by proper management of the confirmed case. On the 25th of October 2017, the outbreak was declared over.

## Public health actions

During the outbreak response, several public health actions were implemented including the isolation of the confirmed case. In addition to these public health actions, we ensured IPC practices such as regular hand washing at both facility and community level. Health education and regular radio talk shows were conducted on the transmission and prevention of Lassa fever. We also ensured proper sanitary practices by cleaning the community and its surrounding and identified feasible dumping sites in the community.

## Recommendations

Due to limited cross-border surveillance activities between Liberia and neighboring Countries (Cote d'Ivoire, Guinea and Sierra Leone), we recommended to the National Public Health Institute of Liberia to strengthen surveillance activities at all local and international borders of Liberia and strengthen surveillance activities between neighboring Countries.

## What is known about this topic

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- Lassa fever is endemic in six of the fifteen counties in Liberia.
- It is an immediate notifiable disease under surveillance.
- Also there have been awareness ongoing about LF mainly in endemic counties.

## What this study adds

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- This study provides to the body of knowledge, an evidence of Lassa fever outbreak in a non-endemic county of Liberia involving a case who had travelled from a neighboring country.

## Competing interests

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The authors declare no competing interests.

## Funding

This investigation and response were funded by Grand Kru County Health Team.

## Authors' contributions

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Jimmy Gboluma Lawubah took lead in the investigation and response and manuscript writing. Maame Amo-Addae, Peter Adewuyi, Himiede Wede Wilson, Fulton Quincy Shannon, Olayinka Ilesanmi, Thomas Nagbe provided technical guidance during the investigation, response, and manuscript writing. Lilian Bulage provided technical guidance during manuscript writing. All the authors read and approved the final manuscript for publication.

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## Figures

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**Figure 1:** Geographical distribution of confirmed Lassa fever cases reported in Liberia 2017

## References

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1. Hallam HJ, Hallam S, Rodriguez SE, Barrett ADT, Beasley DWC, Chua A, et al. Baseline mapping of Lassa fever virology, epidemiology and vaccine research and development. *Npj Vaccines*. 2018 Mar 20;3(1):11. <https://doi.org/10.1038/s41541-018-0049-5>. [PubMed](#) | [Google Scholar](#)
2. Dzotsi E, Ohene S-A, Asiedu-Bekoe F, Amankwa J, Sarkodie B, Adjabeng M, et al. The First Cases of Lassa fever in Ghana. *Ghana Med J*. 2012 Sep;46(3):166-70. [PubMed](#) | [Google Scholar](#)
3. Saksuriyongse T, Glutting JP. [Nigeria's Rapid Response to Its Worst Lassa Fever Outbreak](#). *AIR*. 2018. Accessed October 2018.
4. Gibb R, Moses L, Redding D, Jones K. Understanding the cryptic nature of Lassa Fever in West Africa. *Pathog Glob Health*. 2017 Sep; 111(6): 276-288. <https://doi.org/10.1080/20477724.2017.1369643>. [PubMed](#) | [Google Scholar](#)
5. Frame JD. Clinical features of Lassa fever in Liberia. *Rev Infect Dis*. 1989 Jun;11(Suppl 4):S783-789. [https://doi.org/10.1093/clinids/11.Supplement\\_4.S783](https://doi.org/10.1093/clinids/11.Supplement_4.S783). [Google Scholar](#)

6. Jason Beaubien. [Nigeria Faces Mystifying Spike in Deadly Lassa Fever](#). NPR.org. 2018. Accessed December 2018.
7. Diseases TLI. Lassa fever and global health security. Lancet Infect Dis. 2018 Apr 1;18(4):35. [https://doi.org/10.1016/s1473-3099\(18\)30179-8](https://doi.org/10.1016/s1473-3099(18)30179-8). [Google Scholar](#)
8. WHO. [Technical guidance on Lassa fever](#). WHO. 2018. Accessed October 2018.
9. WHO. [Lassa Fever - Liberia](#). WHO. 2018. Accessed October 2018.
10. IAMAT. [Liberia: Routine Immunization](#). IAMAT. 2020. Accessed October 2020.



**Figure 1:** Geographical distribution of confirmed Lassa fever cases reported in Liberia 2017