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Epidemiological Pattern of Lassa Fever Contacts in a Southwestern State of Nigeria, 2023 to 2025

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ABSTRACT

Background: Lassa fever (LF) continues to pose a significant public health challenge in Nigeria. Despite the government's efforts to control the outbreak, the number of morbidity and mortality from LF continues to be reported year-round. Contact tracing remains an important public health tool for tracking and halting infection; however, few studies have described contact distribution.

Objective: This study aimed to describe the distribution of LF contacts by place, the characteristics of persons involved, and the period of exposure.

Methods: A retrospective secondary data analysis of Lassa fever contacts was conducted using data on contacts identified and line-listed from January 2023 to September 2025. Key variables analysed include: socio-demographic characteristics, date of contact tracing, quarantine, symptoms, and contact status. Descriptive and analytical analysis were conducted, with the statistical significance set at $p< 0.05$.

Results: A total of 5,483 LF contact records were analysed. Most contacts were located in the northern and central senatorial Local Government Areas (LGAs) of the state, particularly Owo LGA (4,627; 84.4%). Above half (3,273; 59.7%) were females, with a mean age of 30.6±15.3 years. Most contacts (4578, 83.5%) were healthcare workers, and 1,827 (33.3%) were identified after 14 days of exposure to a confirmed case. Less than one-tenth of contacts were under quarantine (151, 2.8%) and symptomatic (272, 5.0%).

Conclusion: Lassa fever contacts were predominantly young adults and healthcare workers, with a substantial proportion identified in Owo Local Government Area and more than 14 days after exposure. We recommend strengthening early contact identification and line listing, including the use of both electronic and community-based contact self-reporting platforms.

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Introduction

Lassa fever, an acute viral hemorrhagic fever, continues to pose a significant public health challenge, particularly in West African Countries, such as Nigeria. According to the Nigeria Center for Disease Control (NCDC) situation report as of September 2026, a cumulative total of 7,938 suspected cases, 1,086 confirmed cases, and a Case Fatality Rate (CFR) of 23.9% have been reported [1]. Ondo State, Nigeria, ranked the highest among the states affected by Lassa fever, with 2,298 suspected cases, 371 confirmed cases, and a CFR of 24% from 1st January to 6th September, 2026 [1] .

Lassa fever is a zoonotic disease caused by the Lassa virus (single-stranded RNA). The virus is harbored by rodents, which serve as the primary host for the infection [2]. Rodents, commonly known as "Multimammate rats," typically transmit the infection to humans through contact with infected urine and feces. The virus can be transmitted from human to human through direct or indirect contact with blood, urine, feces, and other secretions from an infected person [2,3]. The virus has an incubation period of 2 to 21 days and may present as asymptomatic in about 80% of infections [3]. For symptomatic cases, the infection gradually starts with fever, general body weakness and malaise. If severe, it could result in facial swelling, fluid in the lung cavity, and bleeding through the mouth, nose, or vaginal [3].

The Nigerian government, through the NCDC, has been responding to the Lassa fever outbreak in affected states. The institution has collaborated with the World Health Organization and other partners to intensify efforts in controlling the outbreak through the Public Health Emergency Operations Center (PHEOC). The PHEOC serves as a platform activated to lead outbreak response at different levels and in several areas, including surveillance, Risk Communication and Community Engagement (RCCE), laboratory, case management, Infection Prevention and Control (IPC), and others [4,5].

Public health surveillance is vital for the continuous and systematic collection, analysis, and interpretation of health-related data for planning, implementation, and evaluation of practices [6]. The Integrated Disease Surveillance and Response (IDSR) is an integral part of the public health surveillance system involving official reporting of diseases or events to designated authorities for early detection of disease outbreaks and to prevent or reduce morbidity and mortality. Under the IDSR framework, disease surveillance and notification (DSN) can occur at individual, local, national, and international levels, depending on the district/ Local Government Area (LGA) disease monitoring and control mechanism and clinicians' active participation [7].

Although no licensed vaccine exists for Lassa fever, most outbreak responses have focused on strengthening surveillance, including contact tracing and follow-up activities, to support prompt detection of symptoms and signs, and reduce the risk of transmission to other susceptible individuals [3,8]. Contact tracing involves identifying individuals exposed to Lassa fever and monitoring them for up to 21 days, the maximum incubation period. If contacts developed symptoms within the follow-up period, they are tested using Reverse Transcription-Polymerase Chain Reaction (RT- PCR) [9].

Lassa fever contact tracing remained hampered by delayed contact identification, dual disease transmission, overlapping early symptoms with other illnesses, and stigma [1,10]. Earlier studies reported losses to follow-up, highlighting operational challenges that undermine the overall effectiveness of detecting secondary transmission [8, 10]. Despite these challenges, contact tracing remains a key public health tool for tracking and stopping infectious diseases; however, the literature exploring its use in outbreak response settings remains limited [11]. Few studies in Nigeria have described the distribution of Lassa fever contacts to better guide outbreak response [8,12]. Hence, this study aimed to describe the distribution of Lassa fever contacts by place, the characteristics of persons involved, and the duration of exposure, as well as identify factors associated with early contact identification in Ondo State, Nigeria. The findings could inform future Lassa fever contact-tracing strategies to reduce secondary transmission in the community.

Methodology

Outbreak Setting

Ondo State is one of the 36 States in the Federal Republic of Nigeria. The state is located in the southwest geopolitical zone of the country, with a projected population of 6,214,872 according to the 2006 national population census [5]. The state is sectioned into three senatorial zones: Ondo North, Central and South, and has 18 LGAs or districts. Seven (7) of the eighteen (18) LGAs have been identified as hotspots for Lassa fever. These LGAs include Akoko Southwest, Akoko Southeast, Akure North, Akure South, Owo, Ose, and Idanre.

Study Setting and Design

We conducted a retrospective secondary data analysis of Lassa fever contacts during the outbreak response in Ondo State, Nigeria, from January 2023 to September 2025. We retrieved data from the Ondo State Ministry of Health (MoH) Lassa fever contacts line list.

Study Population (Inclusion and Exclusion Criteria)

All Lassa fever contacts line-listed using the Kobo Collect application were included for analysis. Data with incomplete critical information were excluded from the study.

Data Collection

Key variables such as location, age, gender, occupation, date of contact tracing, date of last contact with the confirmed case, quarantine, symptom, and contact status were retrieved from the Lassa fever contact line-listing database. Trained contact tracers used the data collection tool to identify and line-list contacts of Lassa fever cases, with support from the World Health Organization and other state partners.

Data Analysis

Data were downloaded as a Microsoft Excel spreadsheet and transferred to STATA version 16 software for analysis. Descriptive analysis was conducted using graphical representations. Chi-square test and binary logistic regression analysis were conducted to identify variables influencing duration of contact identification. Variables significant at a p- value of <0.05 were considered statistically significant. In the logistic regression analysis, the unadjusted and adjusted Odds Ratios, as well as the confidence intervals (CI) were determined.

Results

Socio-demographic Characteristics of Lassa Fever Contacts

A total of 5483 contact line-listing data were analyzed. Most Lassa fever contacts were in the northern and central senatorial districts, with a large majority in Owo LGA (4627, 84.4%), followed by Akure South (411, 7.5%) and Akure North LGAs (211, 3.8%) (Figure 1). Above half (3,273; 59.7%) of contacts were females, and within the age group 30-39 years (2,106; 38.4%) and 40-49 years (1,972, 36.0%) (Mean: 30.6±15.3) (Figure 2).

Most (4578, 83.5%) contacts were healthcare workers, followed by transporters (378, 6.9%) and traditional healers (334, 6.1%) (Figure 3).

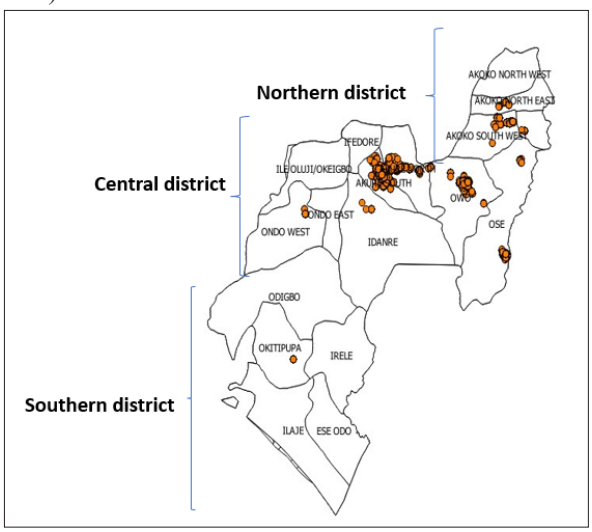
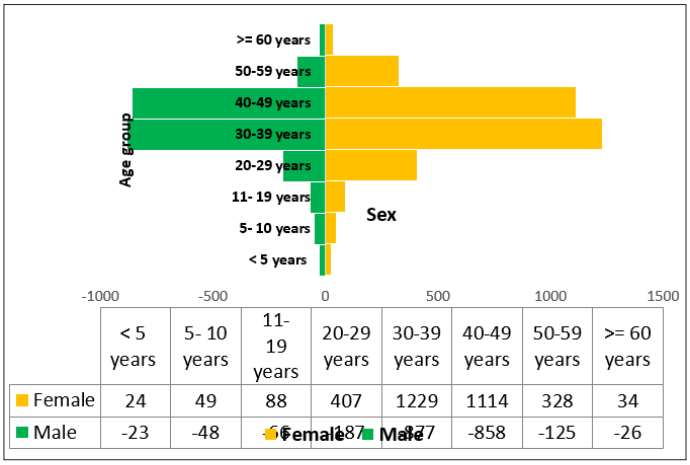


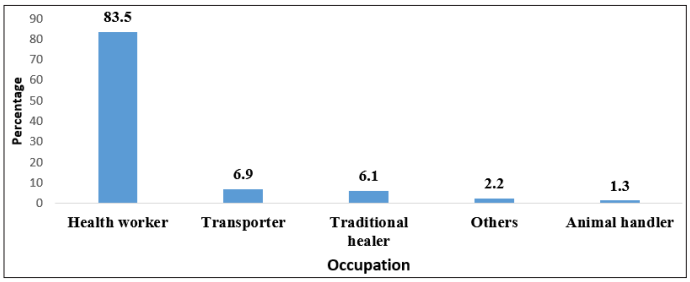
Figure 1: Map Distribution of Lassa Fever Contacts in Ondo State

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	< 5 years	5- 10 years	11- 19 years	20-29 years	30-39 years	40-49 years	50-59 years	>= 60 years
Female	24	49	88	407	1229	1114	328	34
Male	-23	-48	-66	-487	-877	-858	-125	-26

Figure 2: Age and Sex Distribution of Lassa Fever Contacts in Ondo State



*Others= Student, civil servants, unemployed

Figure 3: Occupation of Lassa Fever Contacts in Ondo State

Identification and Exposure Status of Lassa Fever Contacts in Ondo State

A total of 151 (2.8%) contacts were under quarantine during line listing (Figure 4). More than one-quarter (1827; 33.3%) of the contacts were identified and line-listed after 14 days of exposure to the confirmed case (Figure 5). A total of 272 (5.0%) contacts were symptomatic, with the main symptoms being fever (43.4%) and headache (36.8%) (Figure 6). Most (4337; 79.1%) of the contacts touched the body fluids of a case during exposure, followed by those who had direct physical contact (1006; 18.3%) (Figure 7).

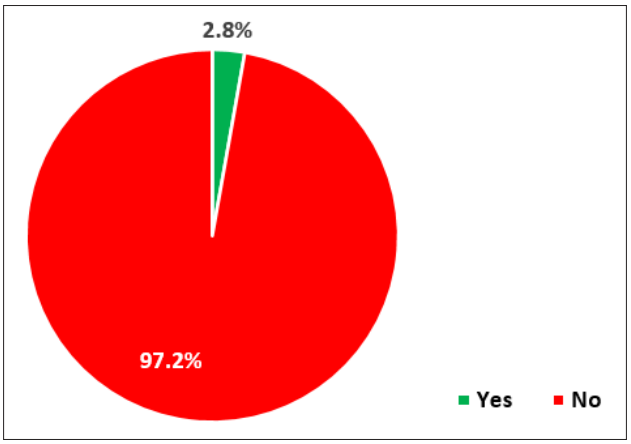


Figure 4: Proportion of Lassa fever Contacts under Quarantine

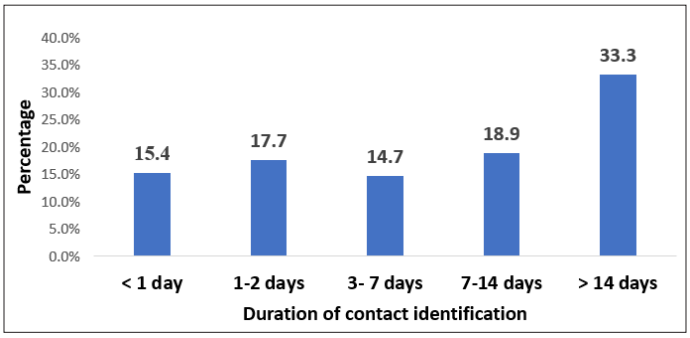


Figure 5: Duration of Contact Identification or Line Listing in Ondo State

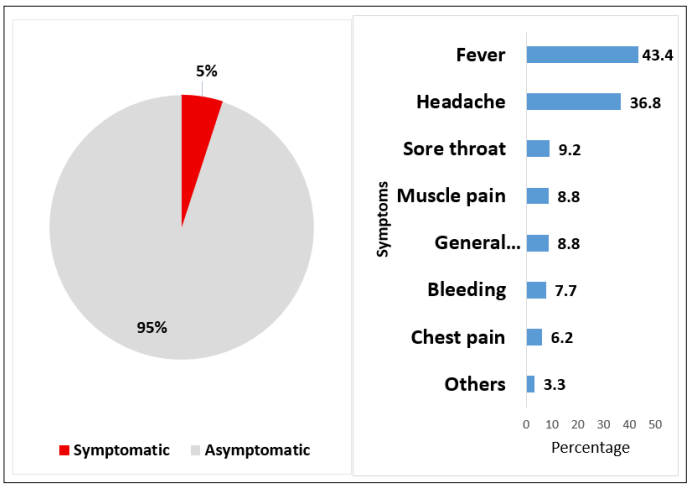


Figure 6: Symptomatic Status of Lassa Fever Contacts in Ondo State

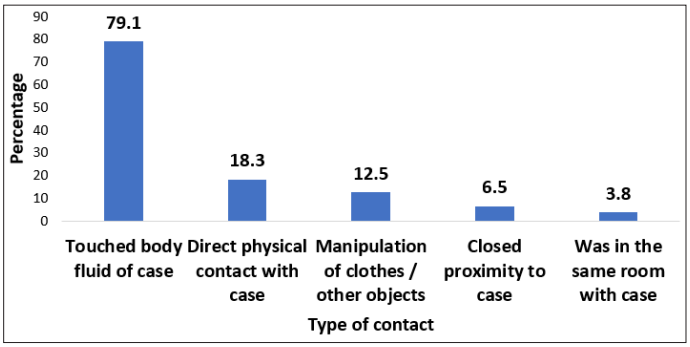


Figure 7: Type of Contact with Lassa Fever Confirmed Case

Factors Associated with Duration of Lassa Fever Contact Identification in Ondo State

Table 1 shows the factors associated with the duration of contact identification. Statistically significant, contacts aged ≤ 35 years had higher odds of being identified within 48 hours of exposure than those > 35 years of age (AOR= 1.4%, 95% CI: 1.21-1.53). Females were about twice as likely to be identified within 48 hours of exposure compared to males (AOR=1.5, 95% CI= 1.33-1.70). Contacts under quarantine had about 2 times higher odds of being identified within 48 hours of exposure than those who were not under quarantine at the time of line listing (AOR=2.1, 95% CI=1.47-3.04). Symptomatic cases were about 4 times more likely to be identified within 48 hours of exposure compared to asymptomatic cases (AOR=3.9, 95% CI=2.94-5.07).

Table 1: Factors Associated with Duration of Lassa fever Contact Identification in Ondo State

Variables n= 5483	Period of contact identification		Total	Unadjusted Odds ratio	AOR (95% CI)
	≤48 hours	> 48 hours			
	n (%)	n (%)			
Age in years					
≤ 35 years	814 (38.8)	1281 (61.1)	2095	1.52	1.4 (1.21 – 1.53)
*> 35 years	1000 (29.5)	2388 (70.5)	3388		
Gender					
Female	1202 (36.7)	2071 (63.3)	3273	1.51	1.5 (1.33 - 1.70)
*Male	612 (27.7)	1598 (72.3)	2210		
Contact under quarantine					
Yes	94 (62.2)	67 (37.8)	151	2.95	2.1 (1.47- 3.04)
*No	1720 (32.3)	3612 (67.7)	5332		
Symptomatic					
Yes	185 (68.0)	87 (32.0)	272	4.67	3.9 (2.94- 5.07)
*No	1629 (31.3)	3582 (68.7)	5211		

Discussions

The study described the epidemiological pattern of Lassa fever contacts during outbreaks in Ondo State, Nigeria, between 2023 and 2025. Many contacts were found in the state's northern and central senatorial zones. These zones have remained a hotspots for Lassa fever outbreaks in Ondo State since 2015 [7]. Similarly, earlier authors found these areas highly susceptible to outbreaks, particularly Owo, Akure South, and Akure North Local Government Areas [13]. The concentration of the contacts in these areas may reflect differences in the distribution of confirmed cases, population mobility, proximity to the testing site, and intensity of contact tracing activities in these LGAs.

This study found that more contacts were female than male and younger. This finding is consistent with earlier studies in Nigeria [8,10,13]. Differences in exposure between males and females may explain this finding; however, gender roles have not been adequately shown to be a significant factor in the transmission of Lassa fever and other viral hemorrhagic fevers (VHF).

We found that most contacts were healthcare workers, consistent with findings from studies in Kogi State, Nigeria [8]. Occupational exposure to suspected or confirmed cases, and access to healthcare workers for contact identification and line lists, may have partly contributed to the high number of contacts listed among them during the outbreaks. Furthermore, health workers play critical roles in managing suspected cases and collecting samples, and thus face continuous exposure, close contact with patients, and environmental contamination in the medical facility. Targeting them with infection prevention and control (IPC) measures may reduce their level of exposure to infectious diseases [13].

We found that a high proportion of contacts were identified and line-listed late, with many not under quarantine when traced. This may contribute to continuous exposure to others individuals, underscoring the need for rapid contact identification. These findings contrast with other studies on Coronavirus 2019 (COVID-19) in the United States of America, where contacts were identified and notified within a shorter duration: 3 days and 6 to 7 days of symptom onset [14-16]. Differences in outbreak settings and disease characteristics may have contributed to shorter contact tracing in earlier studies [14-16]. Delays in contact identification may stem from several issues, including reported operational challenges [8]. This critical gap may limit the overall effectiveness of breaking the chain of disease transmission and detecting secondary infection. In addition, because most contacts were healthcare workers, they may have had difficulty quarantining due to the country's current health workforce shortages [17].

Consistent with earlier findings, most contacts were asymptomatic, which may contribute to community spread if not followed up and quarantined [8,12,13]. Among the symptomatic cases, many presented with fever and headache. These symptoms are common and make the illness difficult to distinguish from other VHFs such as Ebola Virus Disease (EVD), and other fever-causing diseases such as malaria, typhoid fever, and yellow fever. This is because of their varied and non-specific presentation [18].

Statistically significant, timely contact identification and list-listing were more common among females, younger individuals, those under quarantine, and symptomatic individuals. Younger cohorts may have maintained denser social and household networks, facilitating quicker contact identification and documentation. Furthermore, females may have been more available and more cooperative than males.

The ability to line list additional contacts under quarantine aligns with the WHO recommendations to separate identified contacts for monitoring early warning signs [19]. In line with our findings an earlier study found an improved overall efficacy of contact tracing among those in quarantine, which helped reduce the burden on non-infected individuals [20]. In addition, symptomatic cases may have cooperated much better with contact identification because they were likely to be more motivated to safeguard the community and their families. A Nigerian study found that most participants were willing to provide contact-tracing information if they were confirmed or suspected to have COVID-19 [21].

Limitations

Some contacts lacked critical information such as age and date of symptom onset. Therefore, we excluded these contacts from the analysis due to missing data, which may contribute to exclusion bias. Excluding these data was necessary to avoid incorrect or unrepresentative conclusions. Secondly, our inability to retrieve

all contact data due to unavailability may limit the generalizability of our findings. This may be because some data were collected using the traditional paper-based form and were not captured in the digital platform.

Conclusion

We found a high number of Lassa fever contacts concentrated in the northern and central zones, among healthcare workers, in younger age groups, and among individuals identified late during line listing. The contacts were identified late among males, adults who were not under quarantine, and those with no symptoms. Therefore, we recommended intensified surveillance in the affected zones, with additional personnel and resources, particularly during periods of increased disease transmission. In addition, healthcare workers should receive adequate infection prevention and control materials, such as personal protective equipment, to handle patients and specimens safely. Both the electronic and community-based contact-tracing systems should be strengthened holistically to standardize reporting, with rapid communication between health facilities and surveillance teams to shorten the time to contact identification. Community risk communication messages targeting both males and females should focus on self-reporting contact with a confirmed case, early symptoms of Lassa fever, and the importance of self-quarantine if exposed to the disease.

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