

1 Analysis of Reported Cases of Lassa Fever in Plateau State and The Need for Strategic 2 Action Plan

3

4 ABSTRACT

5 **Background:** Lassa fever is a fatal haemorrhagic disease endemic in West Africa. Following
6 the index case in Lassa, Nigeria in 1969, outbreaks of Lassa fever have become common in
7 Nigeria. This study sought to document recent trends in Lassa mortality in Plateau State

8 **Methodology:** We targeted the State Ministry of Health (SMoH) and tertiary hospitals in the
9 State. Ethical approval was obtained from the SMoH and Plateau State Specialist Hospital
10 (PSSH), Jos. Data on Lassa fever cases was obtained from the targeted health institutions and
11 analysed statistically.

12 **Results:** 59 suspected cases were reported within the period under review. 48(81.3%) were
13 from Northern Plateau, 5 (8.5%) from Central Plateau, 2(3.4%) from Southern Plateau while
14 4(6.8%) from states bordering Plateau. Percentage mortality of cases in 2012, 2013 and 2014
15 stood at 70.0%, 36.4% and 18.5% respectively.

16 **Discussion/Conclusion:** Although reported cases are on the rise, prompt administration of
17 ribavirin by experienced health care workers may be responsible for declined mortality.
18 Improvement on intervention strategies, training, diagnostic facilities should be prioritized.

19 **Keywords:** Lassa fever, report, Plateau State

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21 INTRODUCTION

22 Lassa fever (LF) is an acute viral haemorrhagic disease that is caused by Lassa fever virus
23 belonging to the genus arenavirus [1]. The name is derived from Lassa, a town in North-
24 eastern Nigeria where the index case was identified. It is a zoonotic disease, with a rodent,
25 *Mastomys natalensis*, as the reservoir [2]. The infection is endemic in West Africa with
26 300,000–500,000 cases and approximately 5,000 deaths reported annually [3]. The virus is
27 transmitted by contact with the faeces or urine of rodents accessing grain stores in residences
28 although human-to-human transmission also occur via contact with infected blood and body
29 fluids [4]. Given the disease’s high incidence rate, it has become a major problem in the
30 African region [5]. Outbreaks of the disease have been recorded in Nigeria, Liberia, Sierra
31 Leone, Guinea and Central Africa but it is believed that human infections also exist in
32 Democratic Republic of Congo, Mali, and Senegal [6].

33 In Nigeria, the index case was reported in 1969. Since then, LF cases have been reported
 34 with increasing frequency. In the 1970s and 1980s, reported cases pointed to the existence of
 35 3 Lassa endemic regions in Nigeria. These included the northern region around Lassa town in
 36 Borno State; the central region around Jos, Plateau State and the southern region around
 37 Onitsha, Anambra State [6,7]. Between 2004 and 2008, states including Edo, Ebonyi, Federal
 38 Capital Territory and Plateau reported more laboratory confirmed cases [8]. By 2009,
 39 Adewuyi et al. [9] reported an epidemic of Lassa virus in Abuja, near Plateau State where 5
 40 deaths were recorded from 12 suspected cases. However, the epidemic assumed a higher
 41 dimension in early 2012 where the Federal Ministry of Health in Nigeria alerted the World
 42 Health Organisation of outbreaks in 19 out of 36 states including Plateau State. 108 were
 43 confirmed Lassa positive out of which 70 died [10]. By the end of 2012, Nigeria had reported
 44 widespread outbreaks in 23 out of 36 States, Plateau State inclusive. Altogether, a total
 45 of 1723 suspected cases including 112 deaths were reported in 2012 [10].

46 Since the first reported case in Jos, Plateau State in the early 70s, the state has been
 47 plagued by sporadic outbreaks of the virus [6,7]. Unfortunately, only a few of these outbreaks
 48 have been thoroughly investigated or reported. It is therefore the thrust of this study to access
 49 available data on the disease from appropriate health authorities for the purpose of analysis
 50 and publication of relevant findings.

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52 MATERIALS AND METHODS

53 Study Area

54 The study was conducted in Plateau State, Nigeria. Plateau State is located in the middle belt
 55 area of Nigeria. It has an area of 26,899 square kilometres with an estimated population of
 56 about four million people. It is located between latitude 8°24'N and longitude 8°32' and
 57 10°38' east. It is a plateau with altitude ranges from around 1,200 meters (about 4000 feet)
 58 to a peak of 1,829 metres above sea level [11]. Politically, it is divided into 3 zones namely:
 59 Northern Plateau, Central Plateau and Southern Plateau as shown in Fig 1 below



60

61 *Fig 1. Map of Plateau State showing the 3 major political divisions.*

62 *Source: Wikipedia, Map of Plateau State*

63 *http://images.search.yahoo.com/search/images;_ylt=A0LEVxXk2T5USbYAZvpXNyoA;_ylu=X3oDMTB0bjAxNj*

64 *[drBHNIYwNzYwRjb2xvA2JmMQR2dGlkA1ZJUDIyN18x?_adv_prop=image&fr=chr-](http://images.search.yahoo.com/search/images;_ylt=A0LEVxXk2T5USbYAZvpXNyoA;_ylu=X3oDMTB0bjAxNj)*

65 *[yff24&va=map+of+plateau+state](http://images.search.yahoo.com/search/images;_ylt=A0LEVxXk2T5USbYAZvpXNyoA;_ylu=X3oDMTB0bjAxNj)*

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67 **Targeted Health Facilities, Patient Group and Data Retrieval Process**

68 We designed a study to survey tertiary health institutions and the State Ministry of Health in
69 Plateau State. We retrieved relevant data on reported LF cases between January, 2012 and
70 July, 2014. We sought for ethical approval from the Institutional Review Boards (IRBs) to
71 carry out the survey. Patients were traced using hospital medical data based on those that
72 were on treatment or had been treated for LF in the facilities within the period under review.

The information was tracked from the Medical Records Departments of the targeted health institutions.

Appropriate clinical, diagnostic and demographic data was systematically collated and analysed using simple statistical tools. Findings were presented in tables for easy interpretation.

RESULTS

Overall a total of 59 suspected cases were reported within the period under review. 48 (81.3%) were from Northern Plateau, 5 (8.5%) from Central Plateau, 2(3.4%) from Southern Plateau while 4(6.8%) were from Southern states bordering Plateau. Males accounted for 55.9% of the reported cases while females accounted for 44.1% (Table 1).

In terms of annual mortality, 7 (70%) of reported cases died in 2012, 8 (36.4%) died in 2013 while 5 (18.5%) died between January and July, 2014 (Table 2)

In 2012, all 10 reported cases in Plateau State were tested for LASV RNA at Lassa Research Laboratory at Irrua Specialist Hospital, Edo State. All but one result was returned and kept in patients' folders with 3 confirmed positive giving 30% prevalence in 2012. Only 54.1% in reported cases in 2013 were tested for LASV RNA, with 22.3% receiving their test results out of which 3 were confirmed LASV RNA positive giving a prevalence of 13.6% for that year. Unfortunately, 31.8% did not have their test results in folders. Between January and July of 2014, only 5 of 27 of laboratory results were returned to patients. A total of 3 returned results were confirmed positive for Lassa virus giving a prevalence of 11.1% (Tables 3&4)

Table 1: Percentage Lassa Fever Outbreaks According to Age and Location in Plateau State

	North	Centre	South	Outside	Total
Male	27 (81.8)	3(9.1)	1 (3.0)	2(6.1)	33 (55.9)
Female	21 (80.8)	2 (7.7)	1 (3.8)	2 (7.7)	26 (44.1)
Total	48 (81.3)	5 (8.5)	2 (3.4)	4 (6.8)	59

97 **Table 2: Annual Percentage Mortality of Reported Lassa Cases in Plateau State**

	Dead	Alive	Total	%Mortality
Year 2012	7	3	10	70.0
Year 2013	8	14	22	36.4
Year 2014	5	22	27	18.5

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99 **Table 3: Annual Distribution of Laboratory Confirmed Cases**

	Tested, Result Returned	Tested, Result not Returned	Not Tested	Total
Year 2012	9 (90.0%)	1 (10.0%)	-	10 (37.0%)
Year 2013	6 (22.3%)	7 (31.8%)	9 (40.9%)	22 (81.5%)
Year 2014	5 (18.5%)	19 (70.4%)	3 (11.1%)	27

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101 **Table 4: Annual Distribution of Outcome of Laboratory Confirmed Cases**

	Positive	Negative	Unknown	%Prevalence
Year 2012	3	6	1	30.0
Year 2013	3	3	16	13.6
Year 2014	3	2	22	11.1

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103 **DISCUSSION**

104 Interestingly, the epidemic of Lassa fever in Plateau State has remained since the early 70s.
 105 The evidence of confirmed cases in the past and those obtained from this study mean that
 106 Lassa fever has established an infection colony in the state. With 81.36% of reported cases
 107 from Northern Plateau, 8.5% from Central Plateau and 3.40% from Southern Plateau, the
 108 threat calls for strategic action across the state since Lassa fever is highly contagious and
 109 responsible for high mortalities and morbidities [12]

110 Although the statistics from Table 1 suggests higher prevalence in Northern Plateau, Central
 111 and Southern Plateau may have been limited in reporting their cases to the targeted health
 112 facilities due to proximity and awareness. This is because Northern Plateau is favoured with

the seat of government as it also hosts all the tertiary health facilities. Government must therefore ensure equity in the distribution of tertiary health facilities as well as extend its surveillance net to the nooks and crannies of the state to ensure all cases are reported.

6.78% of the cases are from neighbouring states, Bauchi and Kaduna, suggesting trans-boundary circulation of the virus around the area. This is particularly so as inhabitants of Plateau and neighbouring states are farmers and hunters. By their occupation, they easily interact with *Mastomys natalensis*, the natural rodent host of the virus, which are ubiquitous in peridomestic environments, hence predisposing the people to Lassa virus infection [13]

With mortalities of 70%, 36.4% and 18.5% of reported cases in 2012, 2013 and 2014 respectively, it has further confirmed earlier reports that Jos, Plateau state is a Lassa endemic region in Nigeria [6,7]. It is however interesting to note the decline in Lassa fever related mortalities in the state within the study period. This may be attributed to increased awareness on the disease, conscious and strategic surveillance programs and access to international aid which has led to availability of ribavirin for early administration to identified cases, a proven strategy in overcoming the epidemic [14,15]

The data in Table 3 revealed that 31.8% and 70.4% of reported cases which submitted for laboratory tests did not have their test results returned to them in 2013 and 2014. It is important to note that the significant rise in the ‘missing’ or unreturned results coincided with the period the international aid the state received for Lassa research ended. However, it is not clear whether the tests were not done due to lack of funds or were done but could not be returned due to a failure in the tracking of logistics from sample collection to return of results since laboratory tests were done in faraway Edo state, some 733km from Jos. This is due to non-availability of Lassa diagnostic facility in Jos, Plateau state. The situation meant that 40.9% and 11.1% of reported cases in 2013 and 2014 respectively were not submitted for laboratory confirmatory tests thereby forcing clinicians to limit diagnosis of Lassa fever to clinical presentations which are misleading giving that Lassa fever mimics Ebola and other haemorrhagic fevers in clinical presentations [16]

The fact that there is no Lassa diagnostic centre in the state is disheartening considering the fact that since early 70s, the disease has been plaguing the state [6,7]. Government and non-governmental organisations must look at this area critically and respond to this health emergency. This call becomes more clarion now as more emerging and re-emerging infections including Ebola disease are threatening Nigeria’s public health in recent times [17]

The Plateau state government must therefore go beyond intensive surveillance to establishing credible diagnostic centres for Lassa, Ebola and other haemorrhagic fevers in the state. Availability of such centres within the state will definitely address the issues of logistics failure relating to sample-result flow chain

With the evidence of clinical and laboratory confirmed cases of Lassa fever in Plateau state since early 70s and the prevalent diagnostic infrastructural deficit on ground, now is the time for government and all health workers in the state to close ranks and develop a road map towards combating the disease. Awareness campaigns on Lassa and other infectious diseases should be stepped up. Health professionals must resolve to sponsor the development of their clinical and diagnostic skills as well as knowledge base without waiting for government support. Medical scientists must develop research paper and grant writing skills to enable them source for international support towards systematic research on key disease agents. Government on its part must show commitment in enhancing the diagnostic facilities in the institutions as highly infectious agents such as Lassa fever need a containment laboratory for a whole scale research [18]

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