

East African Medical Journal Vol. 95 No. 3 March 2018

A RETROSPECTIVE VIEW OF LASSA FEVER OUTBREAK IN NIGERIA (2012- 2017)

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## A RETROSPECTIVE VIEW OF LASSA FEVER OUTBREAK IN NIGERIA (2012-2017)

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### ABSTRACT

**Objective:** High mortality is attributed to Lassa fever in Nigeria, making it a disease of great public health importance. In the last 3 years (2015- 2018), the disease has continued to be on the increase. This study examined the retrospective view of Lassa fever outbreak in the last six years (2012-2017) in order to ascertain the spread of the disease.

**Methodology:** Data on Lassa fever from 2012 – 2017 was used for this study. The data was collected, collated and SPSS was used to analyze the data in line with the set objectives.

**Results:** The findings confirmed increase in the spread of Lassa fever in many states of Nigeria. Young people are more affected by the disease and more males than females are also more affected in the ratio of 3:2. The disease is spread throughout the year; and the attack rate and case fatality rate remain high especially in Edo, Ondo and Ebonyi states. Timeliness and completeness report data were barely 80% indicating poor data reporting system as all cases ought to be completely and timely reported in order to detect early and follow up on an unusual trend of disease occurrence.

**Conclusion:** From the findings in this study, Lassa fever is still on the increase in Nigeria. Continuous surveillance and vibrant case management should be employed by all tiers of health care. The government should ask for assistance from other countries to fight Lassa fever to a halt.

### INTRODUCTION

Lassa fever is a viral hemorrhagic fever (VHF). Viral hemorrhagic fevers refer to a group of illnesses that are caused by several distinct families of viruses: Arenaviruses, Filoviruses, Bunyaviruses and Flaviviruses.<sup>1</sup> It was first discovered nearly 50 years ago in Nigeria and since then, other African countries have reported it. These countries

include Guinea, Liberia, Sierra-Leone, Burkina Faso, Ghana, Cote d'Ivoire and Mali.<sup>2</sup>

<sup>3</sup> However, the disease is very much endemic in West Africa particularly in Benin, Ghana, Guinea, Liberia, Mali, Sierra Leone, and Nigeria. Nigeria has been reported to have Lassa virus antibody levels of up to 21% and it is one of the VHF of great public health concern.<sup>4</sup> Lassa fever infection is caused by Arenavirus and is the most infectious VHF; it

is enveloped RNA viruses and its survival is dependent on an animal host (rats are a natural reservoir). Humans are not a natural reservoir but are infected when they come into contact with infected hosts. After transmission from the animal host, humans can transmit the virus to one another and outbreaks occur sporadically and irregularly.<sup>1, 5</sup>

Lassa fever is globally responsible for an estimated 300,000 – 500,000 infections annually, with 5,000 deaths.<sup>5, 6</sup> Lassa fever infection has a rodent reservoir; *Mastomys* species (“multimammate rat”).<sup>5, 6</sup> Spread occurs when following ingestion of food contaminated with bodily fluids, direct consumption or bite; or through aerosol inhalation of excretions in air (vector – to – human transmission). It can also be through direct contact with the blood and/or secretions of an infected person or, following contact with objects, such as needles, that have been contaminated with infected secretions (human- human transmission). The infection period is 2-21 days.<sup>5, 6</sup>

Between 1969 and 2008, Lassa fever cases were reported in only six to seven states of Nigeria’s 36 states; but between 2009 and 2015 this doubled to between 10 and 14 states reporting outbreaks.<sup>8</sup> In 2016 at least 26 states reported cases of outbreaks.<sup>8</sup> Previously, Lassa fever only occurred during the dry season in Nigeria, but the disease is now found throughout the year. Despite these increases, outbreaks have been accepted as “normal” and not elevated to a national emergency status. As a result Nigerian authorities seem to have been caught unprepared with each outbreak.<sup>10</sup> Lassa fever is a zoonotic disease spread to humans from animals and people get infected through contact with household items, food, water, or air contaminated with the droppings or urine

of infected multimammate rats (*Mastomys natalensis*). Inhaling air contaminated with aerosols of rodent excretions, swallowing the virus in food or contaminated utensils, coming in contact with open wounds, preparing and eating multimammate rats. Travelers to endemic areas, like West Africa, are at risk especially when they stay in homes or areas of poor sanitation or crowding.<sup>10</sup> Health care professionals, such as doctors, nurses, laboratory scientists are most at risk and pregnant women in their last trimester are at high risk of complications.<sup>10</sup> The public health importance of Lassa fever cannot be over emphasized if one considers the high virulence and infectivity as well as the mortality rates associated with the disease. To date, there is no vaccine to prevent the infection of Lassa fever. In Nigeria, the disease has claimed many lives; this high mortality attributed with the disease, makes it a disease of great public health importance. In addition to the high mortality rate, is the fact that it affects all age groups and both genders; therefore, everyone needs to be on alert because of its high virulence.

Since 2012, there has been a continuous outbreak of Lassa fever in Nigeria.<sup>6, 7</sup> Since then, the Federal and State governments are responding to the outbreak by enhancing disease surveillance for early detection, reinforcing treatment of patients, and conducting awareness campaigns among the affected population. However, it is perceived that the disease is spreading to more states and local government areas in the country with a probable increase in case fatality. This perception has been corroborated by the WHO<sup>11, 12</sup> in its 2017 report where it pointed out that 17 Nigerian states reported at least one confirmed case of Lassa fever between December 2016 and June 2017. It further revealed that a total of 501 suspected cases,

including 104 deaths, have been reported between December 2016 and June 9, 2017.<sup>11, 12</sup> Despite the preparedness and control put in place by the government and stakeholders to curtail Lassa fever, the disease continues to be on the increase yearly and continues to be a major public health issue in Nigeria.

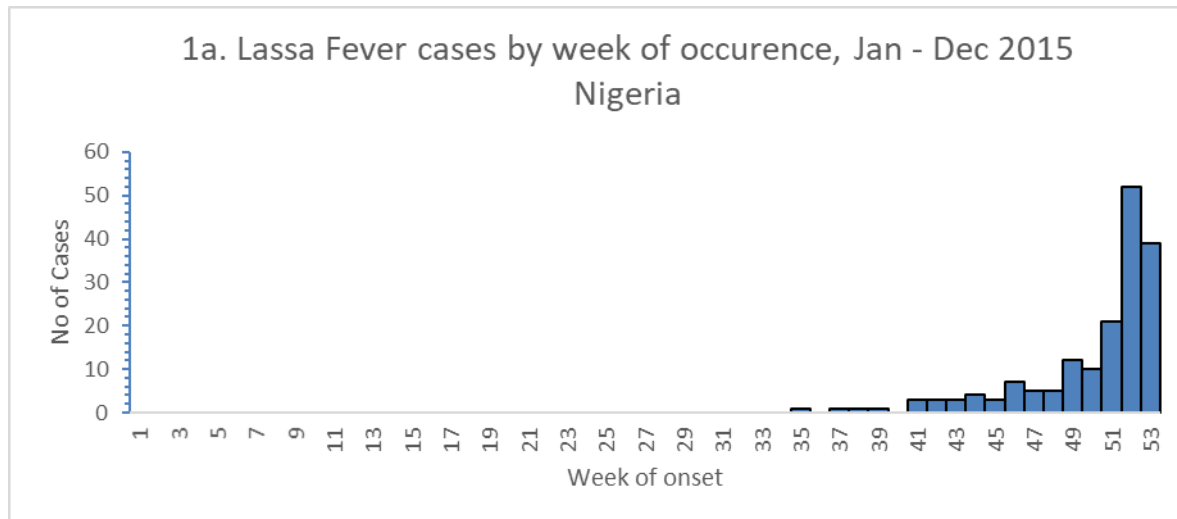
This study examined the retrospective view of Lassa fever outbreak for six years (2012-2017) in order to ascertain the exact perspective concerning the spread, trend and case fatality of the disease; also to specifically examine the 2017 Lassa fever data with regard to timeliness and completeness of data. The study also characterized the outbreak of Lassa fever in terms of person, place and time; determine if there is a relationship between the demographic variables of gender, age and

occupation in the spread of Lassa fever in 2017.

## MATERIALS AND METHODS

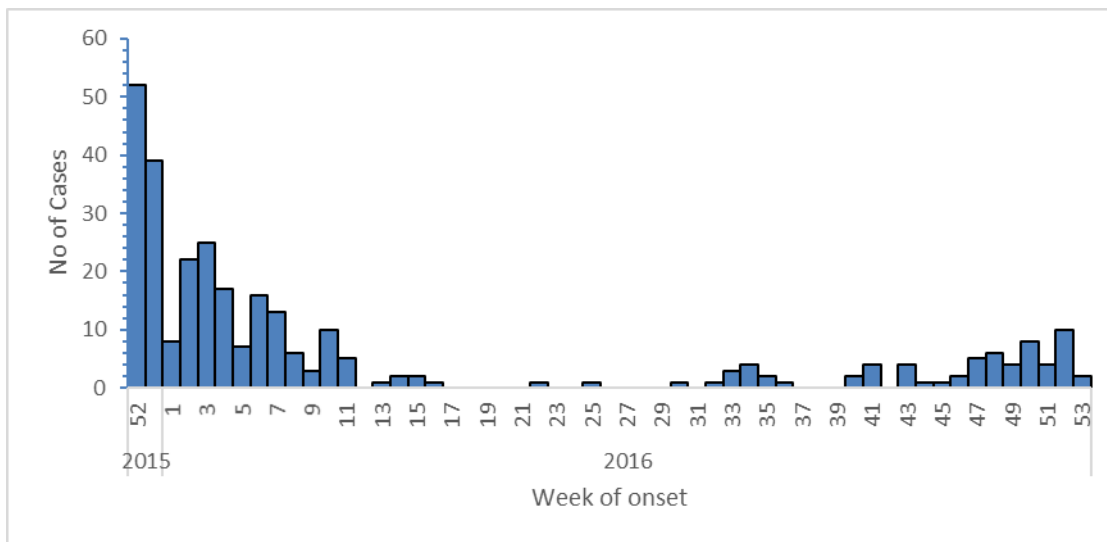
The data used for this study is retrospective secondary data collected with the permission of the Chief Executive Director (CEO) of the Nigeria Centre for Disease Control and Prevention (NCDC). Available data was used from 2012- 2017 which has been the years that NCDC has been documenting Lassa fever data in the country. The data focused on Lassa fever cases for the six years under study and was collected in April 2018. They were analyzed within 2 weeks of collection. The data was collated using SPSS 23 and excel.

## RESULTS



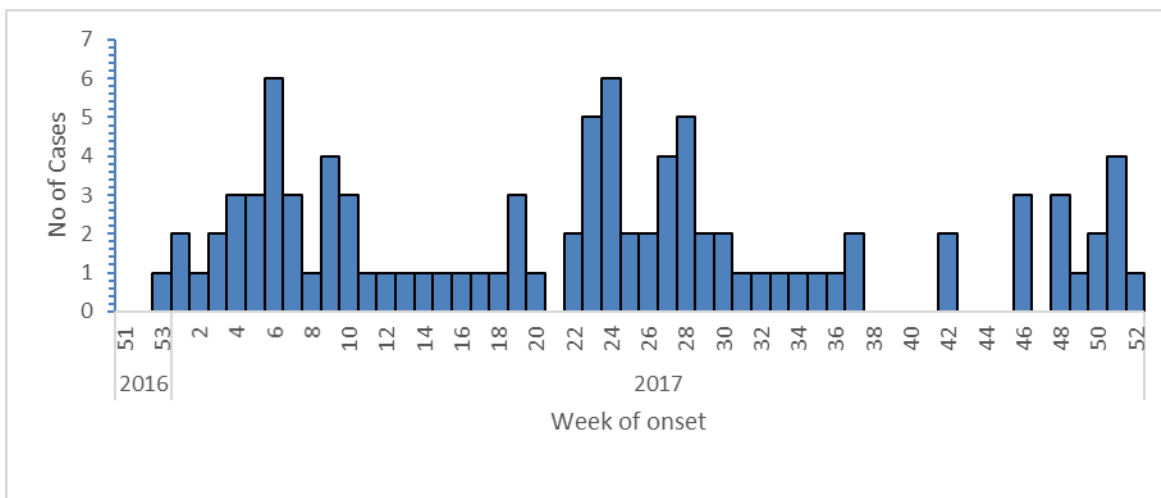
**Figures 1a – 1c Epidemiology curves by weeks of occurrence and year (Source: Field work, 2018)**

Figure 1a shows that in 2015, Lassa fever started relatively late in the year (35<sup>th</sup> week) and peaked at the 52<sup>nd</sup> week of the year.



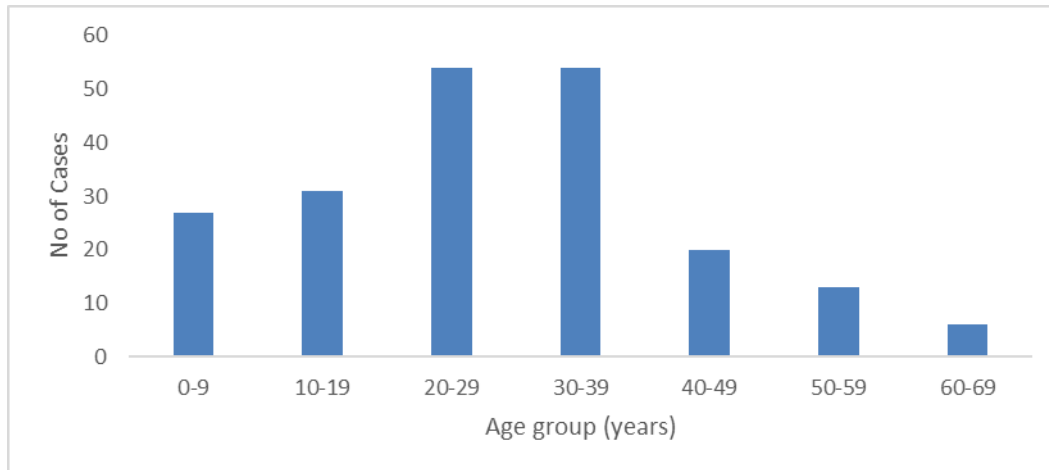
**Figure 1b. Lassa fever cases by week of onset, Jan - Dec 2016 Nigeria (Source: Field work, 2018).**

Figure 1b shows that Lassa started early in 2016 and reduced in intensity towards the end of that year.



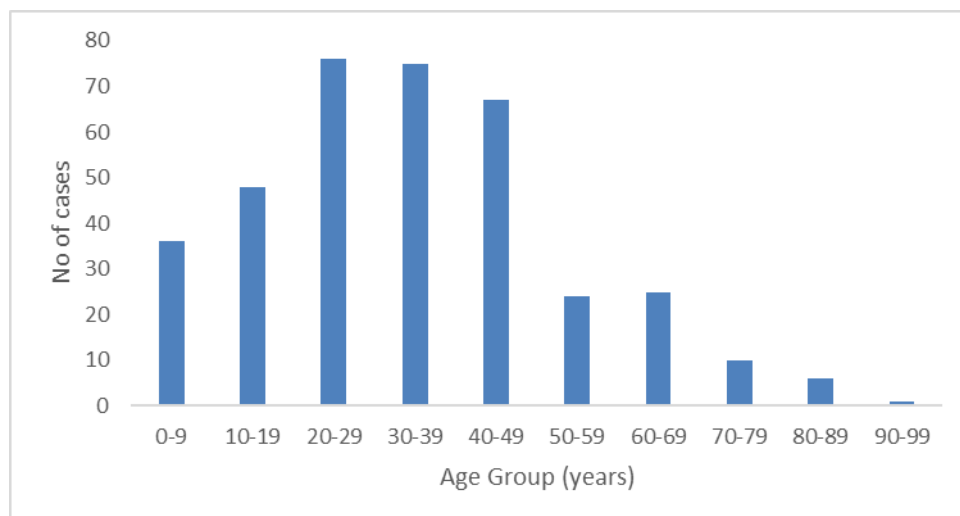
**Figure 1c. Lassa fever cases by week of onset, Jan - Dec 2017 Nigeria (Source: Field work, 2018).**

Figure 1c shows that Lassa was quite predominant almost throughout that year.



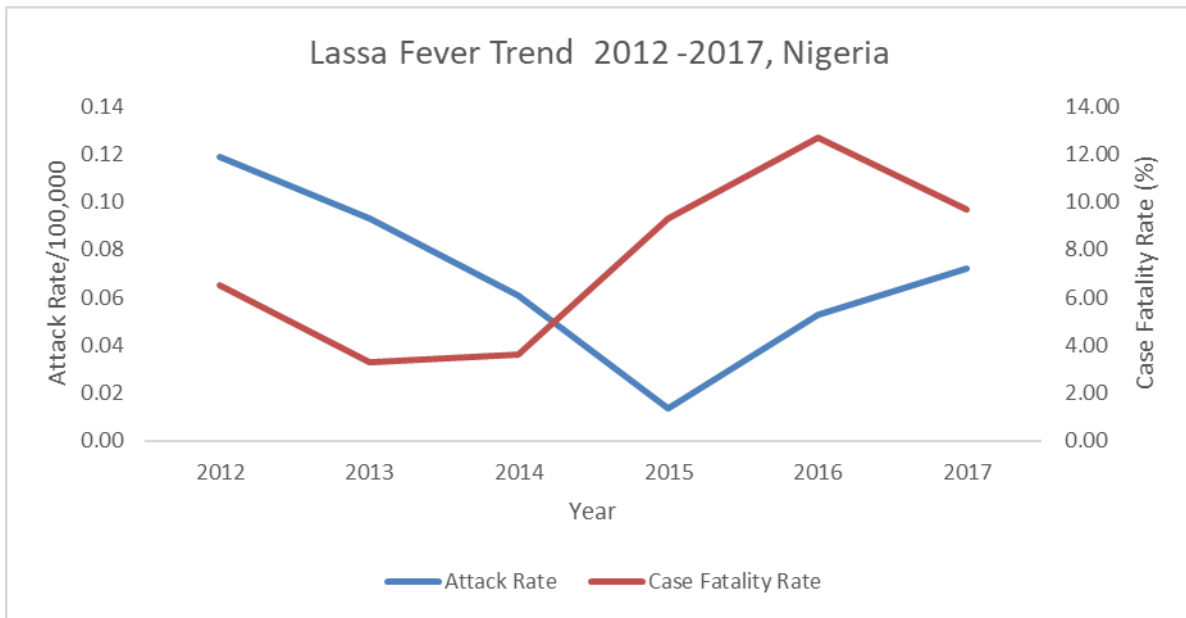
**Figure 2a. Lassa fever by Age Distribution Jan - Dec, 2016 (Source: Field work, 2018)**

Figure 2a shows that the age group between 20 – 39 years had the highest incidence of Lassa fever. Males were more affected than females (3:2 ratio).



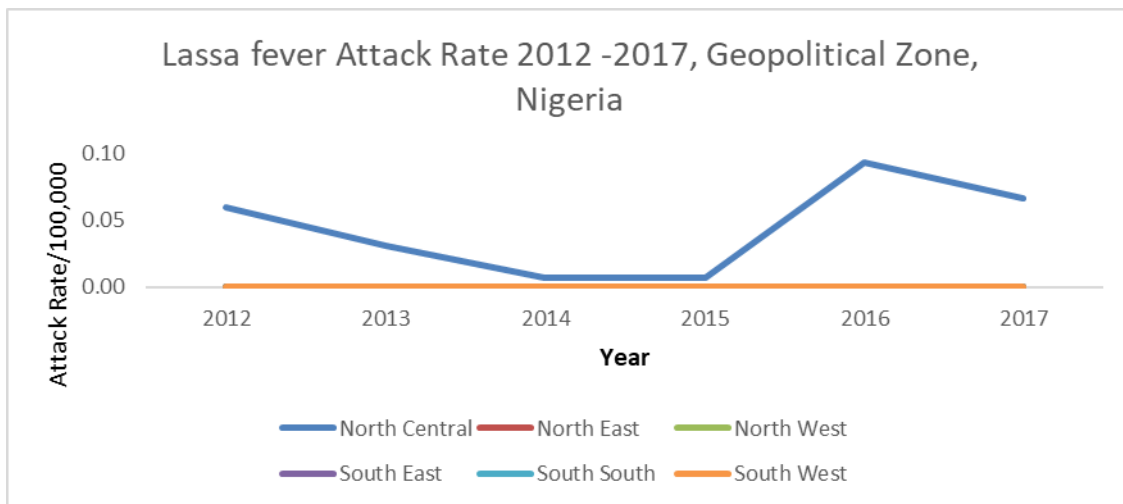
**Figure 2b. Lassa Fever by Age Distribution Jan - Dec, 2017 (Source: Field work, 2018)**

Figure 2b Median Age 32 years (2 months – 95 years). All age groups were affected by Lassa fever. Age group most affected: 20 – 49 years.



**Figure 3 Trend of Lassa in Nigeria 2012 – 2017 (Source: Field work, 2018)**

Figure 3 shows that attack rate of Lassa in Nigeria that apparently reduced in 2015, peaked again in 2017. The case fatality rate also peaked and was higher than the attack rate.



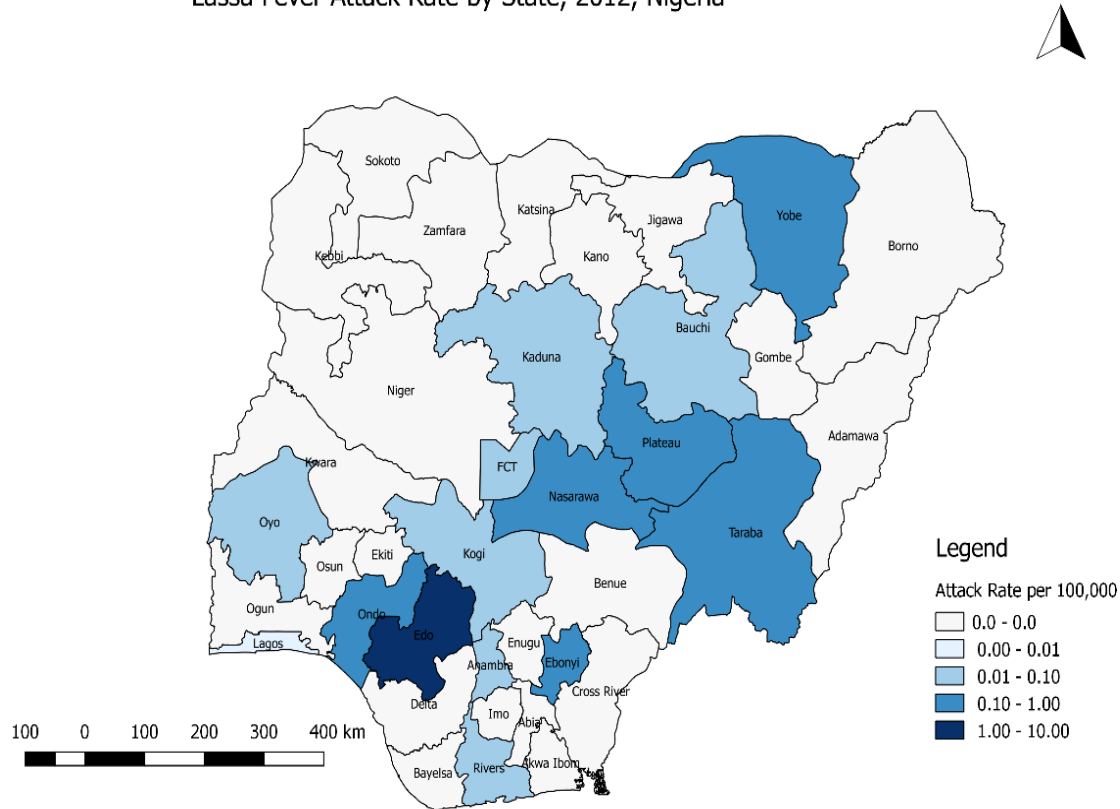
**Figure 4 Attack rates by geopolitical zone distribution (Source: Field work, 2018)**

Figure 4 shows that the attack rate of Lassa fever in North Central zone was relatively higher than other zones displayed but was strikingly high in 2016 and dropped in 2017, though still much higher than other zones.

The attack rate in North Central zone was particularly high in 2016, though it dropped a little in 2017 (figure 4). This indicates that both case management and surveillance in this zone should be intensified.

Figures 5a- 5f show the Attack rate of Lassa by states in Nigeria 2012 – 2017. The results also revealed that Lassa fever continued to spread to more states and zones in the country.

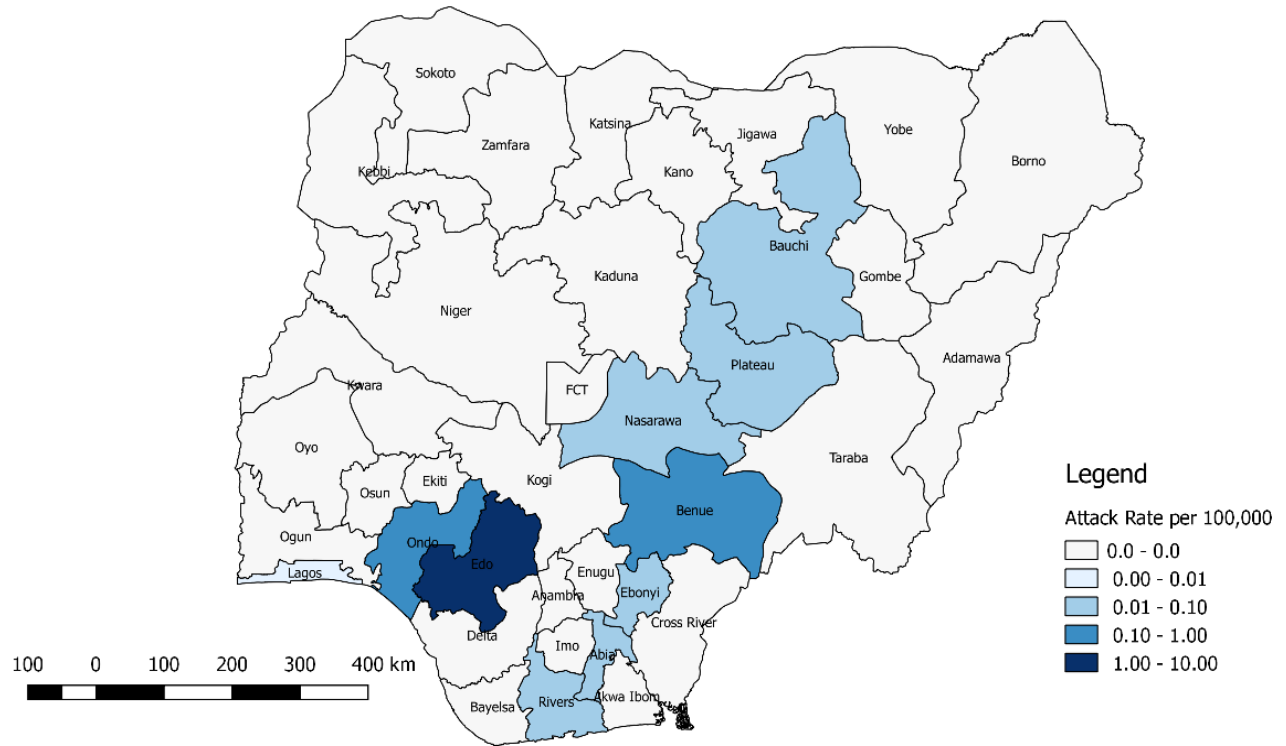
Lassa Fever Attack Rate by State, 2012, Nigeria



Source: Field work

Figure 5a shows that Edo state had the highest number of attack of Lassa

### Lassa Fever Attack Rate by State, 2013, Nigeria

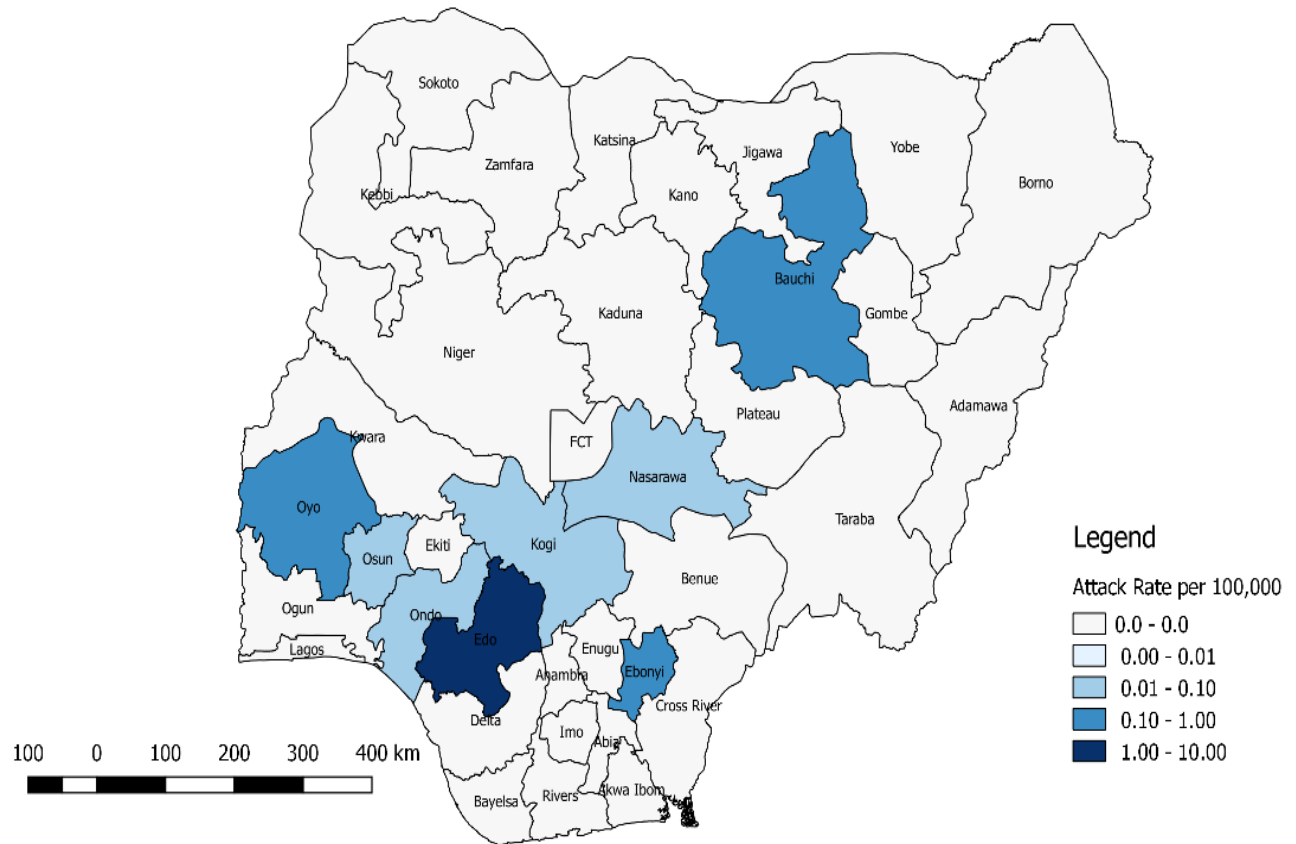


Source: Field work

Figure 5b has almost the same pattern of spread like 5a



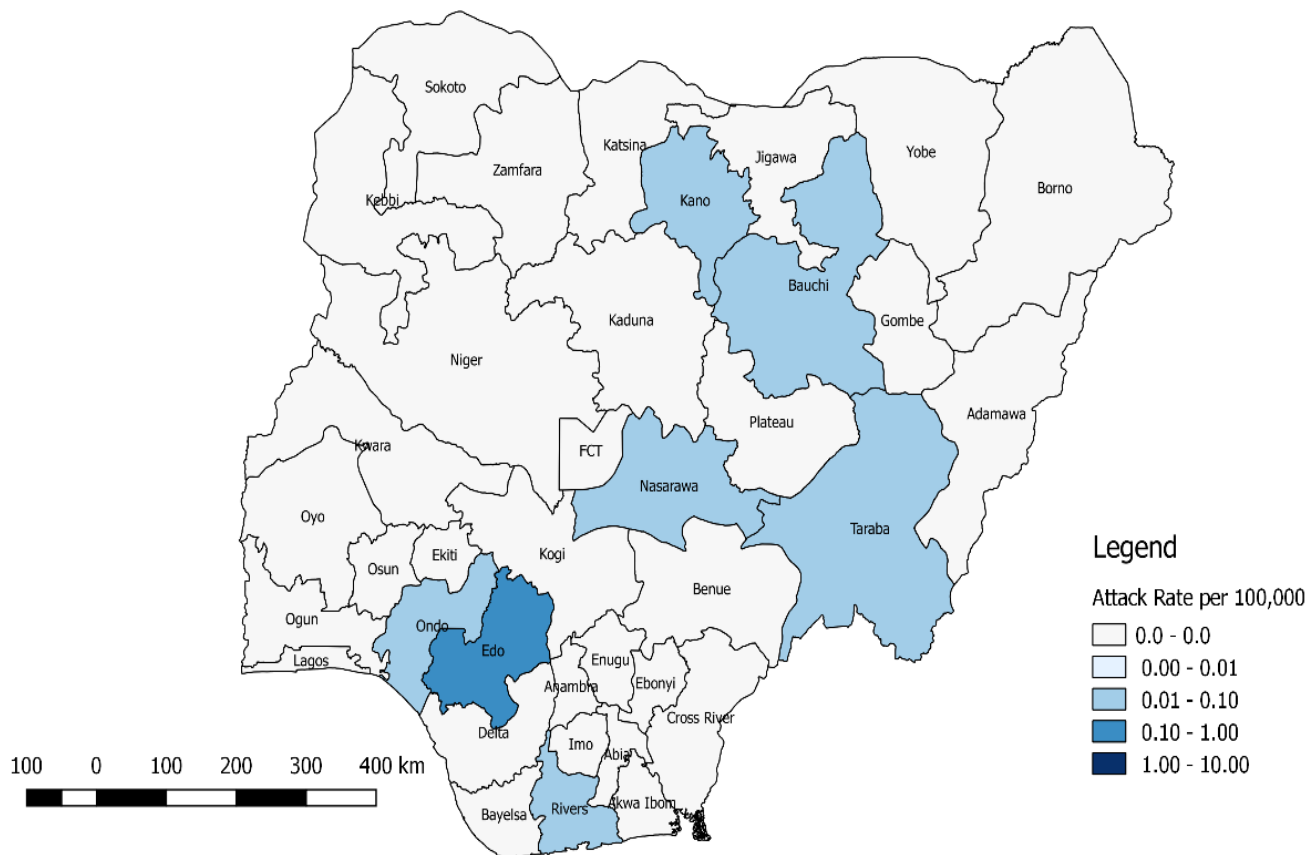
### Lassa Fever Attack Rate by State, 2014, Nigeria



Source: Field work

**Figure 5c shows a different spread pattern of attack rate. Southwest was significantly affected**

### Lassa Fever Attack Rate by State, 2015, Nigeria

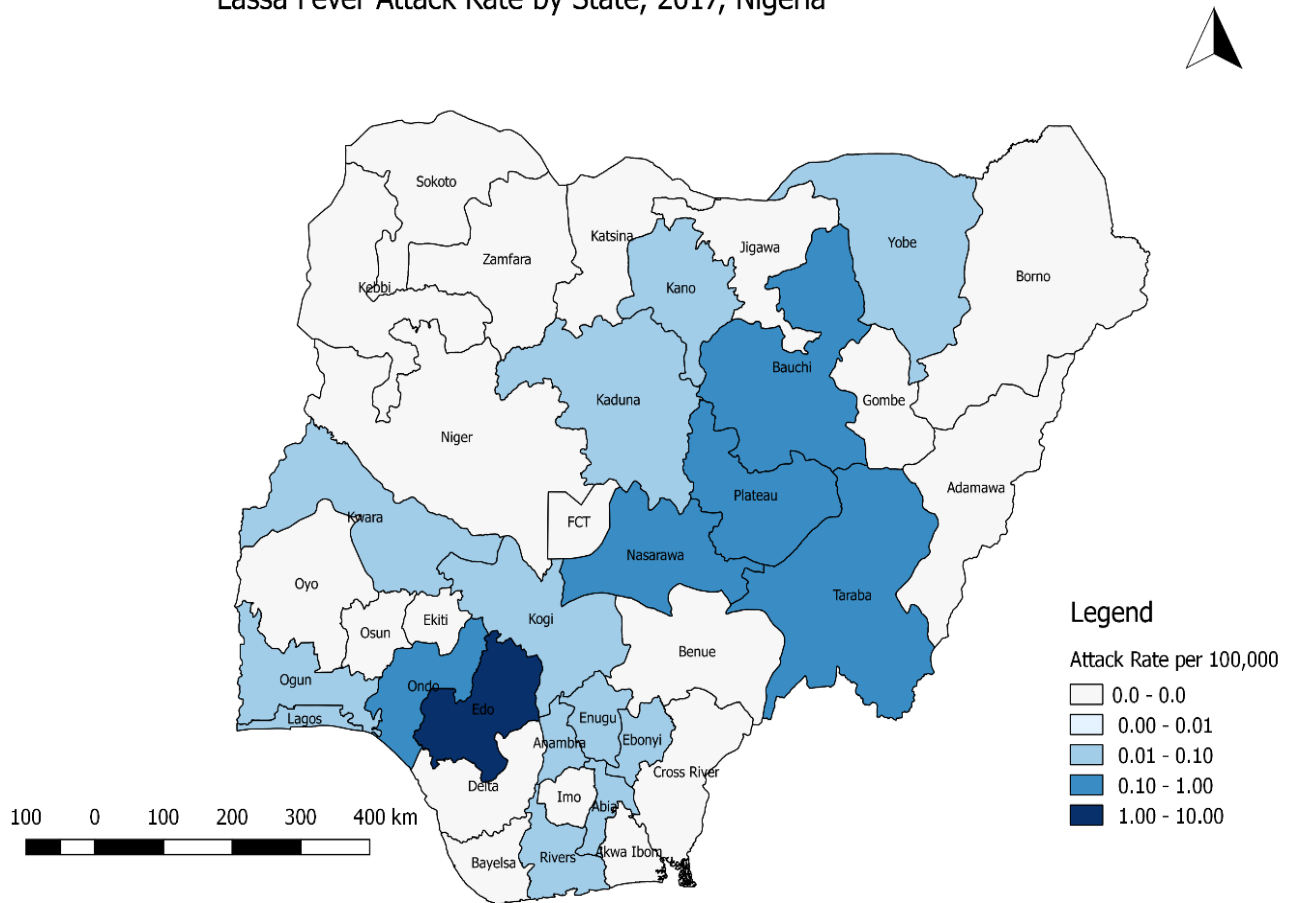


Source: Field work

Figure 5d shows the same pattern of attack rate as 2014



### Lassa Fever Attack Rate by State, 2017, Nigeria



Source: Field work

Figure 5f shows that the attack rate spread was almost the same as 2016. The attack rate is still very marked as it was in 2012. There appears to be no difference.

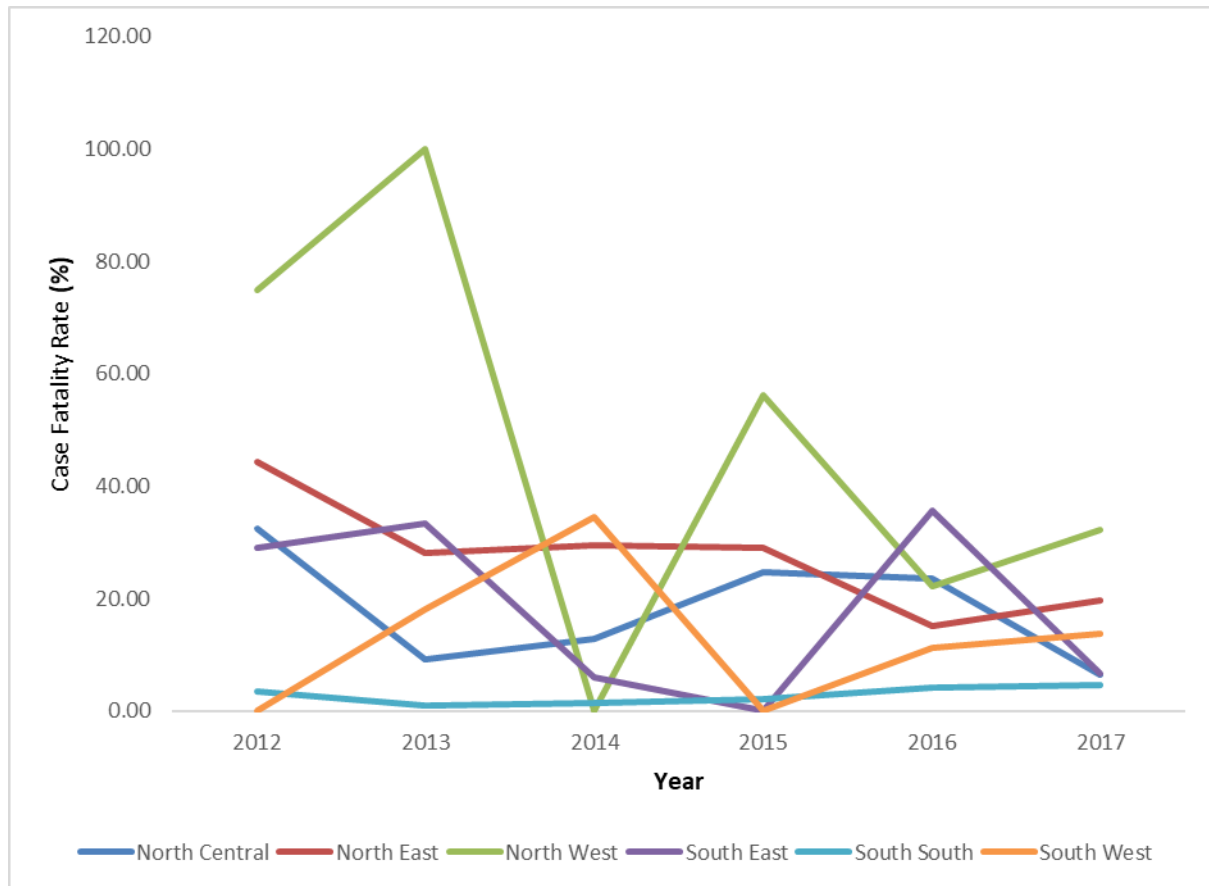
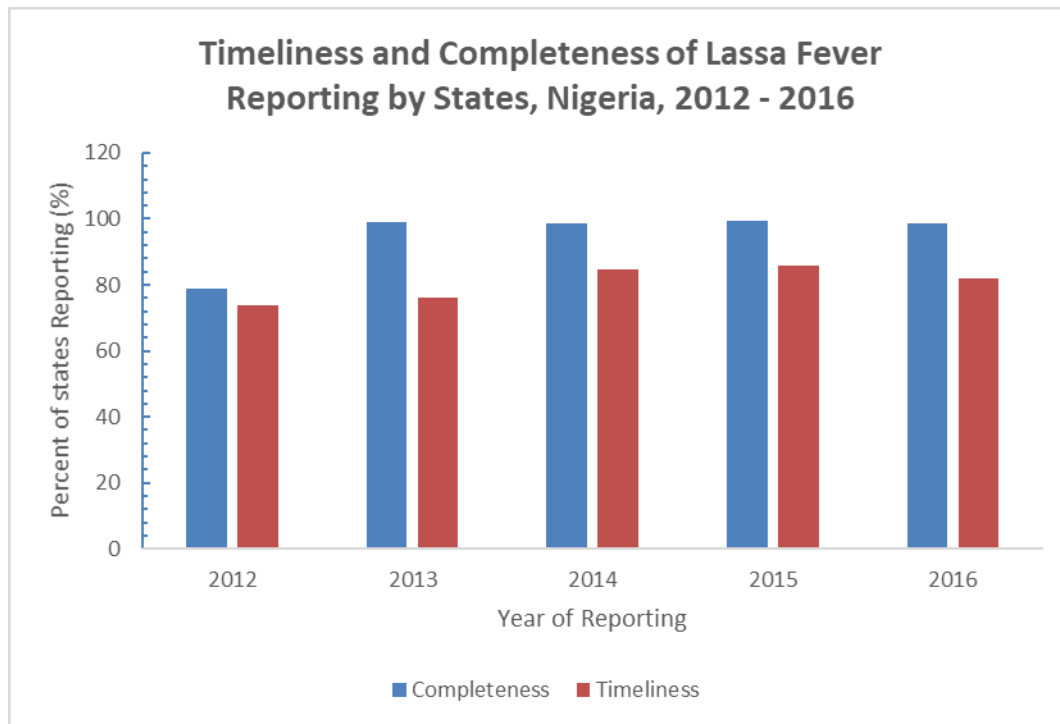


Figure 6 Lassa fever Case Fatality Rate 2012 -2017, Geopolitical Zones, Nigeria (Source: Field work, 2018)

Figure 6 shows that North West and North East have the highest incidence of case fatality in the spread of the disease.



**Figure 7 Timeliness and Completeness of Lassa Reporting in Nigeria, 2012 – 2016. (Source: Field work, 2018)**

Figure 7 shows that completeness of data was slightly above the barest minimum of 80%. Timeliness was consistently below 80%.

## DISCUSSION

Retrospective data on Lassa fever in Nigeria for six years was presented and examined as available. The spread and trend of the data for years examined (2012-2017) revealed that the disease occurs anytime of the year. Unlike previous years ago, the disease used to be rampant in the dry season only; but now it is spread throughout the year as revealed in 2016 and 2017 (figure 1 b-c). The disease has become very wide spread in Nigeria; it used to be in the northern part of Nigeria, but now it has spread to nearly all the geopolitical zones but it is worst some states: Edo, Ondo and Ebonyi. The maps of Nigeria (fig 5a-f) show succinctly the spread of the disease round the states of the federation. This increasing spread has also been revealed in

previous studies by other researchers<sup>16</sup> This spread is worrisome because it shows that Nigerians are all at more risk of contracting the disease. This is a call for more proactive surveillance to put a check to this deadly disease.

To characterize Lassa fever spread in time is quite uncertain going by the result of this study. Only 3 out of the 6 years intended show this characterization in time. The first graph shows its occurrence at the end of the year 2015 (1a) and the other shows its occurrence early in 2016, while the third shows its occurrence almost throughout the entire year of 2017. This kind of spread cannot be easily categorized except more research is carried out to really know the exact pattern of the disease. The characterization by time is still controversial among researchers. A

previous study carried out by Mustapha<sup>17</sup> had revealed that Lassa fever occurs more during the dry season. This may be because there is a lot of bush burning around this time which makes the environment too hot for the rats to stay in and have to run into homes of individuals for shelter, thus causing more infection by polluting the food of man.<sup>17</sup> Other studies have also revealed that it occurs throughout the year.<sup>16, 17</sup>

Characterization of the disease in terms of person is also not definite because this study shows that it affects all age groups and both genders. Although, males appear more affected than females; ratio 3:2 and 6:5. The finding in this study corroborates that of previous study carried out by Gibb in West Africa where they revealed that Lassa affect all age groups.<sup>18</sup> In this study the age group between 20 – 49 years appears most affected. It is suspected that people in this age group (20 – 49) are the ones that go hunting for bush meat and are undaunted in subjecting themselves to risks. They may eat the rat meat directly or may have had more bites from rats in the bush. This is a cause for concern because this group of people are in the prime of life and of economic importance to the country. Everyone has to rise up to bring this deadly disease to a stop.

#### *Timeliness and Completeness of Reporting Lassa fever*

The other finding in this study is the inadequacy of the timeliness and completeness data. Timeliness is used to assess data quality and refers to the time expectation for the accessibility of data. Completeness of reporting indicates whether facilities have reported on the data they are supposed to report on, while timeliness indicates whether these reports were delivered on time. Timeliness is calculated based on a whether the reports have been

completed within a set number of days after the end of the reporting period. In Nigeria, timeliness is assessed at the national level by the number of states that submit their data report by 12 midnight on Wednesdays. Completeness is simply judged by detailing the submitted data. Monitoring whether surveillance reports are received on time and if all health facilities have reported is an essential first step in the routine analysis of the surveillance system. This assists the national (or other level) surveillance team in identifying silent areas (areas where health events may be occurring but which are not being reported) or health facilities that need assistance in transmitting their reports.<sup>19</sup> When the surveillance system is good, the rates for timeliness and completeness should approach 100%, however, at least 80% is acceptable as good enough percentage for timeliness and completeness.<sup>19</sup> In this study, timeliness is barely 80% and completeness is just 80% in the years calculated. This reflects a relative poor data quality which engenders infection because the apt action to be taken if information concerning an infection or outbreak got to the national on time would be delayed. Efforts have to be made to improve on this reporting of data especially as Incomplete or inaccurate data can influence the detection of an unusual trend of disease occurrence. In the same vein, timeliness of surveillance data can affect the ability to respond rapidly and implement control measures. Therefore, to enable early detection of outbreaks, data reports must be received and reviewed in a timely manner.

#### *Attack rate and Case Fatality*

The rate of attack and case fatality of Lassa fever is on the increase in Nigeria. In the last three years (2015 till date), attack rate and case fatality rate have been on the increase (figures 3 & 4). This implies that Lassa fever is

increasing and killing more people in the country. This finding corroborates the finding of other researchers.<sup>16, 17, 18, 19</sup> There is the need for brainstorming to take action that will bring this disease to a halt. Of particular note is the continuous need of public health education concerning the cause and spread of the disease. This is very important as the disease tend to spread more in a crowded, unclean environment, among people in the rural areas

who continue to eat rats as the protein in their meal. Northwest and northeast geopolitical zones appear to have more case fatalities (figure 6). This also implies that case management teams and health educators need to be increased in number so that they are able to cover more regions in the country in order to put a check on this virulent infection.

### CONCLUSION

From the finding of this study, it is revealed that over the years Lassa fever has been on the increase in Nigeria and it is spreading at an alarming rate and requires continuous monitoring. All health professionals and stakeholders should pull resources together to prevent and control Lassa fever. Continuous surveillance and proactive case management should be employed by all tiers of health care (primary, state and National). Health educators should get to the grassroots to teach the people how to prevent spread of infection; covering all food containers, de-rat all rooms and premises to prevent rats from co-habiting with human beings. The government should ask for assistance from other countries to fight Lassa fever to a halt.

### ACKNOWLEDGEMENTS

I would like to express my sincere gratitude to Dr Patricia Poteat In a very special way, I appreciate Dr Mary Lou Ciolfi; her guidance and kind words helped me all the time in carrying out this study. I am indeed indebted to the Chief Executive Officer (CEO) of the Nigerian Centre for Disease Control and Prevention (NCDC) for granting me permission to use their data and also grateful for all the surveillance unit staff of NCDC for their support.

### REFERENCES

1. Center for Disease Control and Prevention. Viral Hemorrhagic Fevers Fact Sheet. From: <http://www.ncdc.gov.ng/diseases/factsheet/30>. Accessed February 6, 2018.
2. Lassa Fever. From <https://www.cdc.gov/vhf/lassa/index.html> Accessed May 25, 2018.
3. Lassa fever. From <http://www.who.int/mediacentre/factsheets/fs179/en/> Accessed February 5, 2018.
4. Viral Haemorrhagic Fevers. From <https://ncdc.gov.ng/diseases/info/V> Accessed June 4, 2018.
5. World Health Organisation. World Health Organisation fact sheet on Lassa fever. 2015; 10 (11).
6. Richmond JK, Baglole DJ. Lassa fever: epidemiology, clinical features, and social consequences. *BMJ*. 2003; **327**(7426): 1271–75. doi: [10.1136/bmj.327.7426.1271](https://doi.org/10.1136/bmj.327.7426.1271).
7. Mofolorunsho KC. Outbreak of Lassa fever in Nigeria: measures for prevention and control. *Pan Afr Med J*. 2016; **23**: 210. doi: [10.11604/pamj.2016.23.210.8923](https://doi.org/10.11604/pamj.2016.23.210.8923).
8. Lassa fever will keep ravaging Nigeria unless better surveillance is put in place. From <https://theconversation.com/lassa-fever-will-keep-ravaging-nigeria-unless-better-surveillance-is-put-in-place-83847> Accessed May 30, 2018.



9. Ibekwe T. Lassa fever: the challenges of curtailing a deadly disease. *The Pan African Medical Journal*. 2012; **11**:55. doi:10.11604/pamj.2012.11.55.1303.
10. Gompf SG. Lassa Fever. From [https://www.medicinenet.com/lassa\\_fever/article.htm#what\\_is\\_lassa\\_fever](https://www.medicinenet.com/lassa_fever/article.htm#what_is_lassa_fever) Accessed May 29, 2018.
11. World Health Organization (WHO). Lassa fever – Nigeria. From [www.who.int](http://www.who.int). Accessed May 30, 2018.
12. World Health Organization. Lassa fever in Nigeria: Global alert and response; 2012. From [http://www.who.int/csr/don/2012\\_04\\_04/en/](http://www.who.int/csr/don/2012_04_04/en/). Accessed May 23, 2018.
13. Achinge IG, Kur TJ, Gyoh KS. Lassa fever outbreak in Makurdi, North Central Nigeria: what you need to know. *IOSR Journal of Dental and Medical Sciences*. 2013; **7**(5):42–6.
14. Integrated Disease Surveillance and Response Technical Guidelines. Nigeria Centre for Disease Control Web site. From [www.ncdc.gov.ng/themes/common/docs/protocols/4\\_1476085948.pdf](http://www.ncdc.gov.ng/themes/common/docs/protocols/4_1476085948.pdf) Accessed February 14, 2018.
15. Three rivers district council data quality strategy. From <https://www.threerivers.gov.uk/download?id=30632> Accessed March 30, 2018.
16. Olayiwola JO, Bakery AS. Epidemiological Trends of Lassa Fever Outbreaks and Insights for Future Control in Nigeria. *International Journal of Tropical Disease & Health*. 2017; **24**(4): 1-14.
17. Mustapha A. Lassa fever: Unveiling the misery of the Nigerian health worker. *Ann Nigerian Med*. 2017; **11**:1-5.
18. Gibb R, Moses LM, Redding DW, Jones KE. Understanding the cryptic nature of Lassa fever in West Africa. *Pathogens and Global Health*. 2017; **111** (6): 276-88, doi: [10.1080/20477724.2017.1369643](https://doi.org/10.1080/20477724.2017.1369643).
19. Isere EE, Fatiregun AA, Ajayi IO. An overview of disease surveillance and notification system in Nigeria and the roles of clinicians in disease outbreak prevention and control. *Niger Med J*. 2015; **56**(3): 161–8. doi: [10.4103/0300-1652.160347](https://doi.org/10.4103/0300-1652.160347).