East African Journal of Health and Science
eajhs.eanso.org
Volume 4, Issue 1, 2019
ISSN: 1373-8772
EAST AFRICAN NATURE & SCIENCE ORGANIZATION

Original Article

Outbreak Investigation of Monkeypox in Akwa Ibom State: A Matched Case Control Study 14th - 24th October 2019

Solomon Chieloka Okoli[1], Lateefat Kikelomo Amao[2], Jessica Toyin Akinrogbe[3], Joshua-Inyang Iniobong[4], & Joel Burga[5]

[1]Federal Ministry of Agriculture, Epidemiology Unit, Abuja Nigeria, okoli28@gmail.com.
[2]Nigerian Centre for Disease Control, Abuja, lateefat.amao@ncdc.gov.
[3]Nigerian Centre for Disease Control, Abuja, akinrogbe@ncdc.gov.
[4]African Field Epidemiology Network, Nigeria, joshuainyang11@gmail.com.
[5]Nigerian Centre for Disease Control, Abuja, joel.burga@ncdc.gov.

DOI: https://doi.org/10.37284/eajhs.1.1.57

Article history:

Received: 10 Nov 2019
Accepted: 20 Nov 2019
Published: 28 Nov 2019

Keywords:

Monkeypox, Disease Outbreak, Infectious Disease Hospital, Disease Notification, Center for Disease Control, Akwa Ibom State, Nigeria

ABSTRACT

Background: Monkeypox (MPX) is a viral zoonoses characterized by pustular rashes similar to smallpox. It is endemic in the Democratic Republic of Congo and West Africa. The outbreak of MPX was first reported outside Africa in 2003 following horizontal infection of *Prairie dogs* by imported African rodents. Two distinct clades are known, the Central (more severe) and the West African clade (Mild). In Nigeria, the first confirmed case of MPX was in a 4-year old child in 1971. This was followed by a lull of 39 years. Since September 2017, sporadic outbreaks have been reported in 17 states across Nigeria. As at week 36 of 2019, Akwa Ibom reported ten suspected cases with one lab-confirmed.

Methods: We revised MPX case definition and constituted a team comprising of State DSNO, Laboratory and RRT from NCDC. We identified retrospective cases from the state line list, their contacts traced and samples collected. We carried out a case-control study on the 3 cases in Mkpat Enin LGA. Twenty-one (21) pre-tested (KAP) questionnaire was administered to health care workers (HCW) and community members to access knowledge awareness and risk perception of MPX. HCWs were trained, and community sensitization carried out. We accessed the capacity of IDH Uyo to manage MPX cases and conducted a case-control study to determine the odds of association of MPX with individuals in contact with confirmed MPX cases at Mkpat Enin LGA.

Results: Eight new cases identified during active case search were negative of MPX. The level of awareness of MPX amongst HCW was high (n=20); pre-test score 16.5(85%) and 18 (90%) posttest. Knowledge of clinical presentation of MPX amongst HCW was also high 17(85%). There was a high-risk perception of MPX 18(90%), assessment of best practice 16 (76%) and proper sample

collection 15 (75%). CM awareness of MPX (n=20) was at 12(62%), health-seeking behaviour at 2(11%) and the consumption of giant rats and monkeys at 12(86%). There was a weak association of transmission of infection by MPX cases to individuals in contact with them {(OR=0.333, (0.0673, 1.6516), Fisher exact 0.1756}. We identified a general apathy by HCW (Nurses) at the IDH Uyo to accept and manage MPX cases.

Conclusion: The high HCW and community awareness negates the poor health-seeking behaviour of members of Ekpat Enin community due to paucity of funds to access health care or rejection by HF within the area. Monkeys and giant rats are delicacies high within the community hence a risk factor in MPX zoonoses. Consequently, individuals who consume such delicacies or come into contact with confirmed cases are at times likely to contact MPX.

INTRODUCTION

Monkeypox (MPX) is a zoonotic viral disease (Beer & Id, 2019; Heymann, Szczeniowski, & Esteves, 1998; Yinka-Ogunleye et al., 2018). It was first identified in 1958 among colonies of monkeys kept for research purposes and its natural reservoirs are presently unknown (CDC, 2019). Wild rodents and primate monkeys are believed to play a role in its transmission (CDC, 2019; WHO, 2018). Two distinct genetic groups of Monkeypox are known; the central and the West Africa group (clade) where the former is responsible for severe morbidity (Beer & Id, 2019; CDC, 2019). Clinical symptoms seen in suspected cases include fever, headache, muscle pains, including lesions such as pustular rashes identical to smallpox except for marked lymphadenopathy in the former (Beer & Id, 2019). Smallpox was eradicated in 1980 since then Monkeypox has grown to global recognition with chickenpox as a differential (Heymann et al., 1998).

Human infection with MPX was first reported in the Democratic Republic of Congo in 1970 (CDC, 2019; Sejvar et al., 2004), then in West Africa where the disease is endemic. Studies on MPX zoonoses conducted between 1970-1980 concluded that Monkeypox outbreaks are sporadic in nature with few human to human infection not exceeding two generations and case fatalities between 1-10% (Heymann et al., 1998; WHO, 2018). However, person to person spread of Monkeypox has been reported three times outside Africa (USA in 2003, UK and Israel in 2018) (CDC, 2019). After over 39 years lull in Monkeypox outbreak in Nigeria, the Nigerian Center for Disease Control (NCDC) was notified of a suspected case of Monkeypox on September 22, 2017 (NCDC, 2017; Yinka-Ogunleye et al., 2018), which was later confirmed to be positive for MPX (NCDC, 2017). Genetic sequencing suggested multiple sources MPX virus into human population (NCDCl, 2019).

Ever since the 2017 case, Nigeria continued to report sporadic cases between January 2019 and September 2019 where 81 suspected cases were reported of which 39 cases were confirmed across nine States namely Bayelsa, Lagos, Delta, Rivers, Akwa Ibom, Enugu, Anambra, Cross River, and Oyo. 59% of the confirmed cases were from two states Delta (28%) and Lagos (26%). Age-group of 21-40 years was the most affected with a range of 15-51 years and median age of 32 years (NCDC, 2019). As a back drop of the outbreaks, Nigeria commenced the *Delphi process* in 2017 in which MPX was gradually transitioned into IDSR. Consequently, in 2019 MPX was listed as priority disease for routine reporting (NCDC, 2018; NCDC, 2019). As at the third quarter of 2019 Akwa Ibom State has reported 10 suspected cases, three of these cases had sample collected, two samples were inconclusive and one positive for Monkeypox. These cases were reported in Ikot Enin ward of Mkpat Enin local government area (LGA). However, there was a worry by the number of suspected cases reported with one confirmed; the Monkeypox technical working group identified poor sample collection and management as a bane of inconclusive results from Akwa Ibom State. Consequently, an enhanced case management and surveillance was recommended to investigate and

support the earlier result in Akwa Ibom State between 14th and 24th October, 2019.

METHODOLOGY

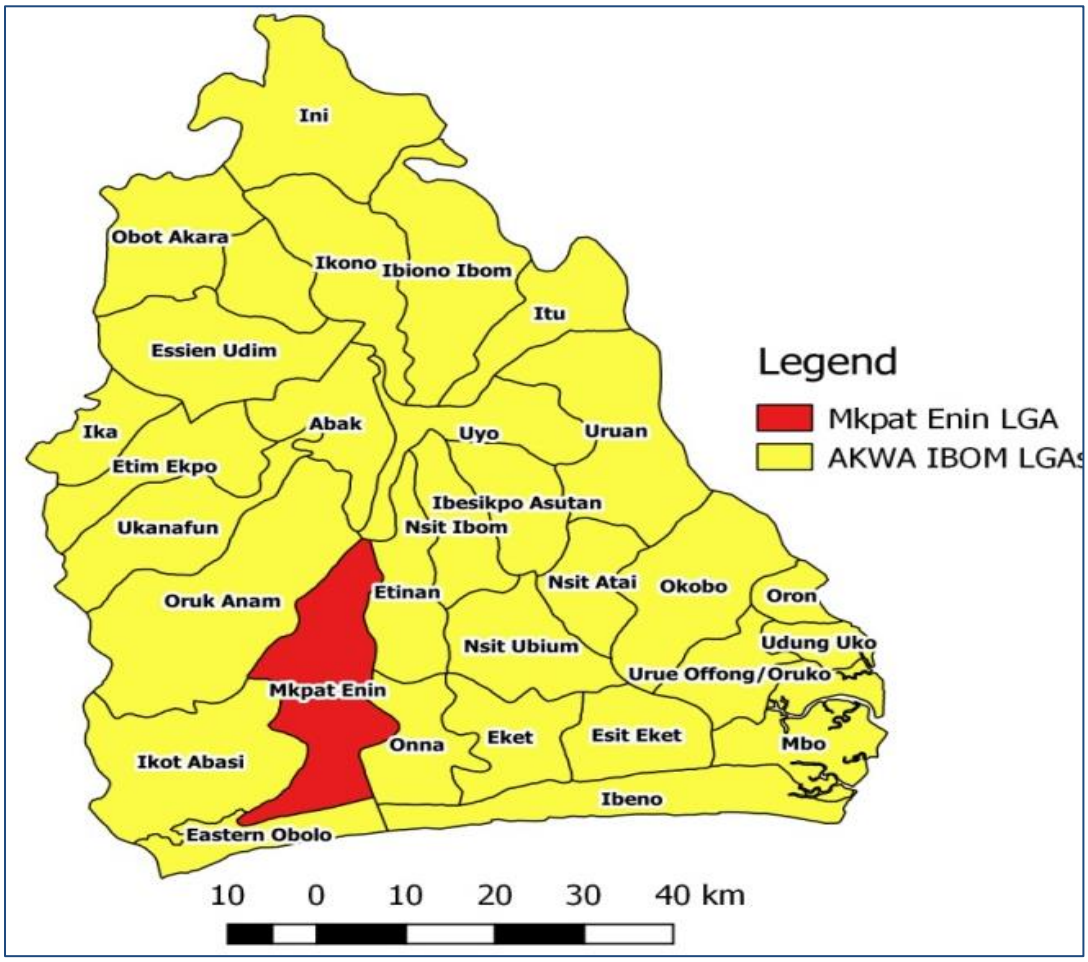
Study Area and Population

Akwa Ibom is a state in Nigeria located in the southern coastal part of the country lying between latitudes 4°32′N and 5°33′N and longitudes 7°25′E and 8°25′E. The state is located in the South-South geopolitical zone and is bordered on the east by Cross River State, by Rivers State and State on the west and by the Atlantic Ocean and the southernmost tip of Cross River State on the south The state's capital is Uyo, with over 500,000 inhabitants

Case Definition of Monkeypox

Suspected case: Any person presenting with a history of sudden onset of fever followed by a vesiculopustular rash occurring mostly on the face, palms and soles of feet. *Confirmed Case:* Any suspected case with laboratory confirmation (Positive IgM Antibody, PCR or Virus isolation). *Contact:* Any person who has no symptoms but who has been in physical contact with a suspected case or with body fluids of a case in the last three weeks (i.e. skin secretions, oral secretions, pre-mastication of food, urine, stools, vomiting, blood, sexual contact) (NCDC, 2019a).

Figure 1: Akwa Ibom State LGAs showing Mkpat Enin LGA



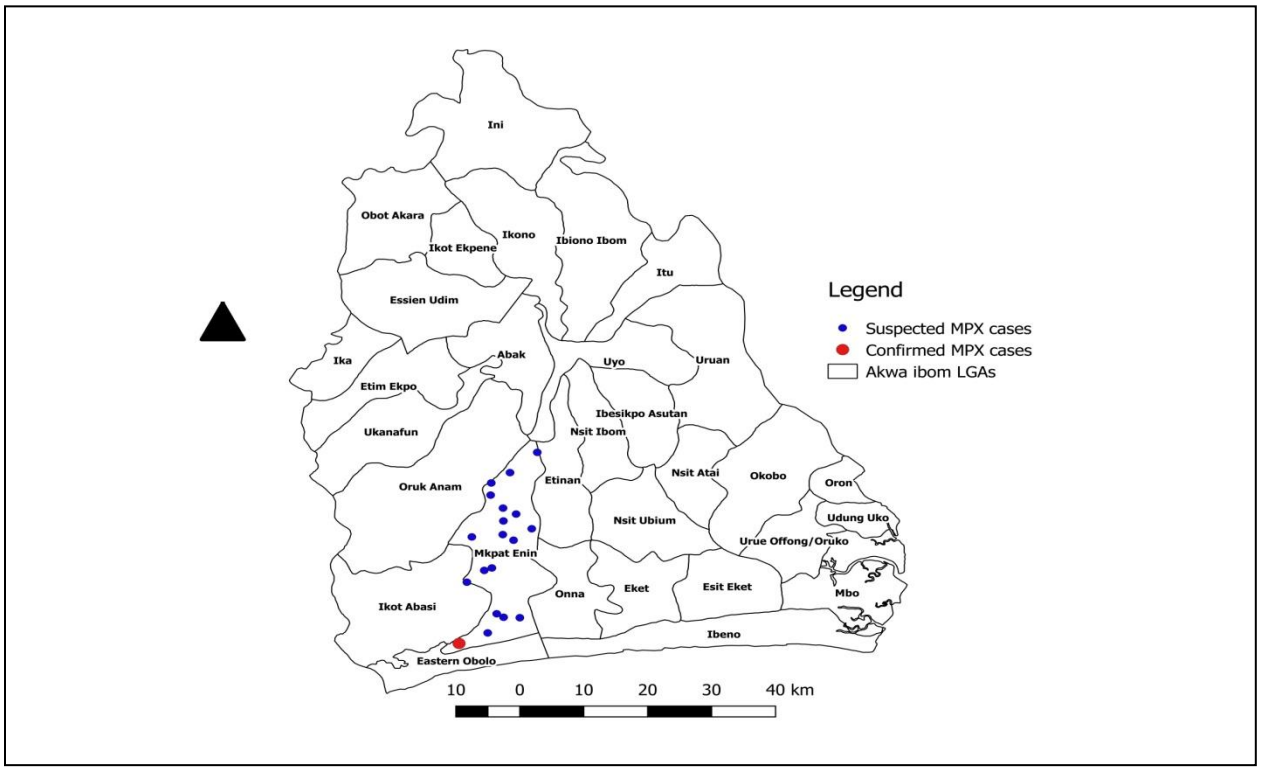
We constituted a team which comprised of DSNO, laboratory, and rapid response team (RRT) from NCDC. Retrospective cases were identified from line list and their contact traced. We identified

suspected cases and collected samples which were sent to the National Reference laboratory (NRL) Abuja for diagnosis. A structure pre-tested questionnaire assessing knowledge, attitude and practice and risk perception (KAP) of health workers and community members at Ikot Enin Mkpat Enin LGA was administered. Search for active cases of MPX cases was conducted in selected health facilities; the isolation ward of infectious disease hospital Uyo was accessed to determine its capacity to manage MPX cases in the state. We carried out a case control study on the 3 cases (one lab confirmed, 2 epidemiology linked) in Mkpat Enin LGA. Selection of cases was as followed 2 control each (index case, husband and child) were selected from (neighborhood, community controls).

RESULTS

Eight suspected cases of MPX were identified and samples collected from 14th – 24th October 2019. These cases were clustered within Mkpat Enin LGA in 3 communities (Ikot Enin, Ndom, and Ikot Akpaden). Cases identified included patients with suspected secondary infection, patient's epidemiological linked to confirmed MPX cases and suspected cases identified during active search. Samples were collected from all 8 suspected during the outbreak response were negative for Monkeypox.

Figure 2: Map of Akwa Ibom showing suspected and confirmed cases of MPX from 6th September to 24th October 2019



Suspected Monkeypox cases identified were clustered within three communities (Ikot Enin, Ndom, and Ikot Akpaden), the sub-urban settle in Mkpat Enin LGA of Akwa Ibom state. Mean and standard deviation of the ages was (25±20) years, range 58 years. The suspected cases were reported between epidemiological weeks 36-40 of 2019.

Suspected Monkeypox cases identified *Plate 1* were obtained from Assistance DSNO Uyo Bottom.

Plate 1: Suspected Monkeypox cases

Figure 3: Age Sex Pyramid of Suspected Cases of MPX in Akwa Ibom State from 6th September to 24th October 2019

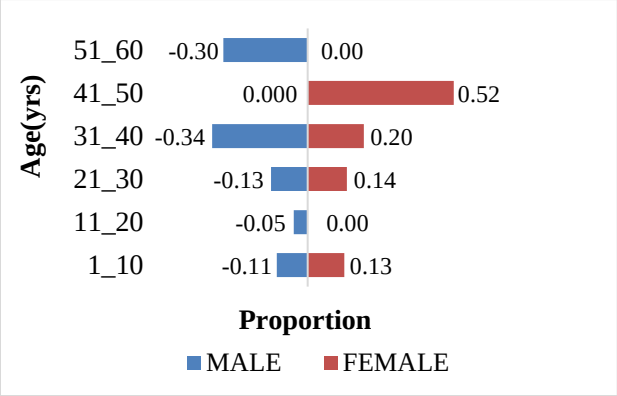
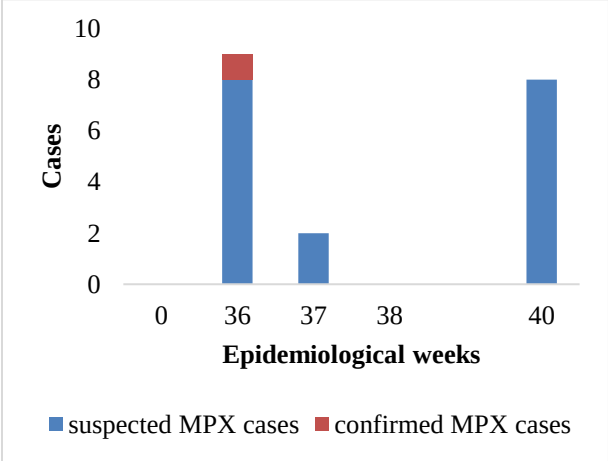


Figure 4: Epicurve of Suspected and Confirmed Cases of MPX in Akwa Ibom State from 6th September to 24th October 2019



Knowledge, Attitude and Practice and Risk Perception (KAP)

An assessment of the knowledge, attitude and practice and risk perception of health workers towards MPX in Akwa Ibom State was conducted between 21st – 23rd October 2019. As part of the outbreak response, 20 laboratory and surveillance focal persons were trained on sample collection and management of suspected MPX samples at Mkpat Enin LGA of Akwa Ibom State, on the 22nd of October 2019. The baseline KAP assessment examined core thematic areas namely, risk perception of MPX, best practices and proper sample collection had a total score of 20. The average pretest score of health care workers (HCW)

was 16.5(85) %, posttest average score was 18(90%).

Figure 5: Evaluation of KAP of HCW in Akwa Ibom State 21st -23rd October 2019

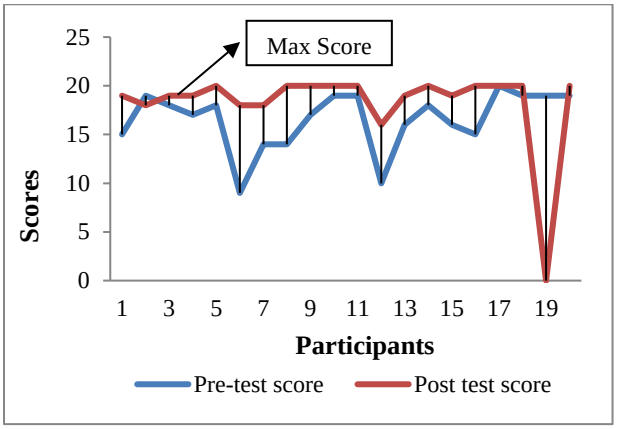


Table 1: Knowledge, Attitude, Practice and Risk Perception of HCW towards MPX

Thematic Areas Assessed HCW Questionnaires	Score and Percentages
Knowledge clinical presentation of MPX	17 (85%)
High risk perception of MPX at HCF	18 (90%)
Assessment of best practice in Management of cases	16 (76%)
Proper sample collection	15 (75%)

Knowledge, attitude, practice and risk perception of communities towards Monkeypox in Ikot Enin Mkpat Enin LGA of Akwa Ibom State was also conducted. Twenty-one KAP questionnaires were administered to community members to assess community knowledge on MPX, attitudes towards MPX, possible risk factors that may predispose to outbreak of MPX within the community.

Table 2: Knowledge, Attitude, Practice and Risk Perception of Communities on MPX

Variable	Values
Mean Age (mean ±std)	35±10
Awareness MPX	N=19
Yes	12(63%)
No	7(36%)
Health seeking	N=18
Yes	2(11%)
No	16(89%)
Exposure Factor MPX (*Eat Giant rats or Monkeys)*	N=14
No	2(14%)
Yes	12(86%)

Analytical Investigation

We carried out a case control study on the 3 cases in Mkpat Enin LGA from 14-24 October 2019. There were 6 controls comprising 2 controls each (index case, husband and child) control.

Table 3: Summary of Cases, Control and Contact Interviewed During MPX Investigation

Variable	Cases (n=3)	Control (n=6)	Contact (n=18)
Age	n=3	n=6	n=18
Mean ±std	35±10	42±18	55±12
Gender	n=3	n=6	n=18
Male	33.3%	3(33%)	5(27.8%)
Male to Female ratio	1:2	2:4	5:13

Exposure Cases = MPX + = 3

Exposure Control = MPX - =2

Unexposed Cases MPX += 6

Unexposed control MPX - = 6

Table 4: A Matched Case Control Study of the Outbreak of MPX from 14th - 24th October 2019

E		CONTROL	TOTAL
	MPX+	3	2	5

CASES	MPX-	6	6	12
	Total	9	8	17

(OR = 0.333, (0.0673, 1.6516), Fisher exact = 0.1756)

Interventions and Training

The team conducted health worker sensitization at the infectious disease hospital (IDH), assessed their level of preparedness to receive and manage Monkeypox cases. LGAs DSNO, surveillance focal persons and selected nurses were trained on case identification and reporting, sample collection and management including on site mentoring of DSNOs on the filling of data forms (CIFs, Lab forms, line list). House to house and market sensitization in affected communities were carried out. Team also distributed IEC materials to DSNOs for onward distribution to their respective Local government areas.

DISCUSSION

The baseline knowledge of HCW and community members at Ikot Enin was high 17(85%), 12(62%); however, the health seeking behavior of community members was very poor 2(11%). These may be attributed to the alleged rejection of patients by health facilities and health care workers for fear of contacting disease steaming from suspected cases. Stigmatization of patient within the communities was also identified by rapid response team (RRT) as a major reason for the poor health seeking behavior. Consequently, the RRT implored the community members and health care workers avoid stigmatizing the suspected patients. Health care workers were trained on sample collection and management as well as provided with personal protective equipment to protect them when managing the suspected cases.

Consumption of monkeys and giant rats was a key delicacy in affected communities, about 12(86%) of respondent consume monkeys and giant rats, these animals may serve as reservoirs to Monkeypox even though this assertion is still debatable, (CDC, 2019; WHO, 2018). Suspected MPX cases were clustered in Mkpat Enin LGA (Ikot Enin, Ndom and Ikot Akpaden), the reason for these clustering is not properly understood further studies are recommended to shed more light on same due to the possibility of human to human transmission (Ladnyj, Ziegler, & Kima, 1972; CDC, 1997; Yinka-Ogunleye et al., 2018). There was a general apathy by nurses at the infectious disease hospital (IDH) Uyo to accept suspected cases of MPX identified by rapid response team; however, he HCW identified poor remuneration and skewed attention focused on medical doctors. These findings coupled with an ageing work force at the IDH made the training of staff a herculean task. These findings were brought to the attention of authorities for necessary action. As part of the measures targeted at curbing the tide of MPX in the state, the honorable commissioner of health held a press conference on Friday 25th October 2019 to sensitize the people of the State about the disease.

CONCLUSION AND RECOMMENDATIONS

Eight suspected cases identified by the RRT were negative of MPX virus. The apathy exhibited by HCW at the IDH should be addressed by management because these may negate any progress made by the RRT. Stigmatization and rejection of suspected MPX cases for care especially by HCW are major militating factors toward identification, management of cases in Mkpat Enin LGA; these should be discouraged by all stakeholders. Sample pickup and delivery time by courier is very poor, in some cases, it took over two days before delivery the samples hence this may affect the integrity and quality of diagnosis made from samples. There was a weak association of transmission of infection by MPX cases to individuals in contact with them; though our sample size was small further analysis involving larger sample size is recommended.

We recommended for NCDC to resolve the issue of TRANEX delay in sample pick up, transportation and delivery at the NRL. To the State, the study recommended it to take complete ownership of the outbreak response; be more proactive in conveying all the suspected cases to IDH; increase community sensitization in all LGAs across the State to stop monkeypox case stigmatization; enhance the state surveillance system to improve case reporting and notification ; and increase community sensitization in all LGAs across the State.

CHALLENGES AND LIMITATIONS

The IDH was not in a good State for use throughout the course of the response. The dedicated ambulance for infectious disease patients was not fixed and make functional throughout the course of the stay of the RRT. All the suspected cases were left within the communities until when the results confirmed negative status. As of 24th October 2019, when the NRRT was leaving the town, none of the suspected cases identified was conveyed to the IDH. The following observations were made paucity of funds to fix the State ambulance to convey the patient; the IDH is not in good condition to receive patients; poor working conditions may have contributed to the perceived unwillingness of the HCWs to receive and manage patients; the number of positive MPX cases was small consequently may affect conclusion deduced from analysis.

It was revealed that without the commitment from the State leadership, the fight against MPX will drag on for years. Integration of the One-health approach should be streamlined at all levels including designing of IEC materials. Community engagement should be strategically integrated into the MPX response (Bottom-Up approaches). Active case search and contact tracing are key to break the transmission of MPX in the community. An early response should be adopted by having in place dedicated funds for emergency. Continuous engagement of the community heads will help to improve case reporting

REFERENCES

Beer, E. M., & Rao, V. B. (2019). A systematic review of the epidemiology of human monkeypox outbreaks and implications for outbreak strategy. *PLoS neglected tropical diseases*, *13*(10).

CDC. (2019). *About Monkeypox*. Retrieved on November 1, 2019, from Center of Disease Cintrol and Prevention at: https://www.cdc.gov/poxvirus/monkeypox/index.html

Heymann, D. L., Szczeniowski, M., & Esteves, K. (1998). Re-emergence of monkeypox in Africa: A review of the past six years. *British Medical Bulletin*, *54*(3), 693–702. https://doi.org/10.1093/oxfordjournals.bmb.a011720

Ladnyj, I. D., Ziegler, P., & Kima, E. (1972). A human infection caused by monkeypox virus in Basankusu Territory, Democratic Republic of the Congo. *Bulletin of the World Health Organization*, *46*(5), 593–597.

NCDC. (2017). *Monkeypox Outbreak in Nigeria - Situation report (No. 008) - November 19, 2017*. Retrieved from Nigerian Center of Disease Control at: https://ncdc.gov.ng/themes/common/files/sitreps/72cb569d609098f0998f92d253c85e58.pdf

NCDC. (2018). Monkeypox outbreak in Nigeria: 25 January, 2018. Retrieved November 2, 2019, from Nigerian Center of Disease Control at: https://ncdc.gov.ng/themes/common/files/sitreps/c526300133141999b051606b0e7d0e6c.pdf

NCDC. (2019a). *Monkeypox case definition*. Retrieved on November 1, 2019, from Nigerian Center of Disease Control at: https://ncdc.gov.ng/diseases/factsheet/54

NCDC. (2019). *Nigeria monkeypox monthly situation report.* Retrieved on November 1, 2019, from Nigerian Center of Disease Control at https://ncdc.gov.ng/themes/common/files/sitreps/caf5c2b9257563dfee0b55cee9a756d8.pdf

Centers for Disease Control and Prevention (CDC. (1997). Human monkeypox--Kasai Oriental, Democratic Republic of Congo, February 1996-October 1997. *MMWR. Morbidity and mortality weekly report*, *46*(49), 1168.

Sejvar, J. J., Chowdary, Y., Schomogyi, M., Stevens, J., Patel, J., Karem, K., … Damon, I. K. (2004). Human Monkeypox Infection: A Family Cluster in the Midwestern United States. *The Journal of Infectious Diseases*, *190*(10), 1833–1840. https://doi.org/10.1086/425039

WHO. (2018). Monkeypox Key facts. Retrieved on November 1, 2019, from World Health Organisation at: https://www.who.int/news-room/fact-sheets/detail/monkeypox

Yinka-Ogunleye, A., Aruna, O., Ogoina, D., Aworabhi, N., Eteng, W., Badaru, S., … Ihekweazu, C. (2018). Reemergence of human monkeypox in Nigeria, 2017. *Emerging Infectious Diseases*, *24*(6), 1149–1151. https://doi.org/10.3201/eid2406.180017