



ISSN: 2476-8642 (Print)

ISSN: 2536-6149 (Online)

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**PUBLISHED BY THE MEDICAL  
AND DENTAL CONSULTANTS ASSOCIATION  
OF NIGERIA, OOUTH, SAGAMU, NIGERIA.**

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## REVIEW

## The Forms, Challenges and Strength of the Monkeypox Surveillance System in Nigeria

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### Summary

Monkeypox is now a disease of global public health concern, making it cut across boundaries into different countries, continents and spread worldwide. However, it originated in the Democratic Republic of Congo as a human pathogen in 1970, with the first case reported in Nigeria in 1971. The World Health Organization recently declared Nigeria the country with the highest burden of monkeypox-confirmed cases and deaths in Africa for the current outbreak. This study aimed to identify forms, challenges, strengths, and ways to further strengthen the surveillance system of monkeypox in Nigeria. We conducted a rapid narrative review of articles published in English on monkeypox between January 2018 and October 2022. Google Scholar and PubMed were searched with the following terms: "Monkeypox", "Surveillance system", "Strengthening", "Challenges" "Nigeria" and relevant publications were reviewed. The forms of surveillance systems in Nigeria include Indicator-based and Event-based surveillance, contact tracing, laboratory-based surveillance, sero-surveillance, and mortality surveillance. Shortage of highly skilled staff in public health interventions, insufficient testing capacities, power instability, poor healthcare systems and stigmatization from communities with misinformation, and co-epidemic surveillance burden in Nigeria are some of the challenges contributing to weak surveillance in the country. The Nigerian governments must focus on investing in surveillance systems and bolster preparedness to stem the rapid spread of infectious diseases. Strengthening the surveillance system in the country as a response intervention for monkeypox is no longer a matter of option in Nigeria but of necessity to prevent the forecasted effect the incidence portends.

*Keywords: Disease outbreak, Monkeypox Virus, Surveillance, Response system, Nigeria.*

## Introduction

The ongoing flare-up of the monkeypox virus is a general well-being challenge presently seen in most regions of the world. Monkeypox disease originated in the Democratic Republic of the Congo as a human pathogen in 1970, while Nigeria experienced the first case in 1971. [1] Monkeypox is currently endemic in ten countries in West and Central Africa, with dozens of cases reported in Cameroon, Nigeria, and the Central African Republic (CAR). [2]

Monkeypox is a disease of public health concern that poses a severe threat to Nigerian health and well-being. [3] Nigeria reported 558 suspected cases from September 2017 to the end of April 2022, of which 231 (41.4%) were confirmed. [4] As of 14 August 2022, Nigeria had 172 monkeypox virus cases, with four deaths, and fifty per cent of the cases recorded among men (Mariam Ileyemi, <https://www.premiumtimesng.com/news/to-p-news/548683-monkeypox-nigeria-confirms-15-new-cases-as-men-account-for-over-50-ofinfections.html#:~:text=Nigeria%20has%20aid%20a%20total,cases%20were%20recorded%20among%20men> 2022).

The World Health Organization (WHO) on Thursday, 08 September 2022, announced Nigeria as the country with the highest burden of confirmed monkeypox cases and deaths in Africa, with a total number of 277 confirmed cases and six deaths as of 10 September 2022 (<https://punchng.com/nigerias-monkeypox-death-toll-highest-in-africa-who/>; 2022). These figures are of great concern in Nigeria and call for urgent intervention, as they suggest a need to look deeper into the surveillance system in Nigeria and to further strengthen it in a country with the highest population in Africa with diverse beliefs, languages and social norms. The current incidence of 481 confirmed cases of monkeypox, as recorded on 12 October 2022, calls for great concern and urgent intervention as this incidence keeps increasing daily. There is a need to delve into the forms and challenges of the surveillance system in Nigeria to

understand and proffer solutions to close the gaps identified. This study will help to understand the challenged Nigeria's surveillance system and suggest ways of enhancing it. This study reviewed and discussed the forms and challenges of the surveillance system and the areas requiring strengthening to achieve a solid and effective surveillance system in Nigeria.

## Methods

A narrative review of data sources was conducted to identify forms, challenges, strengths, and how to strengthen the monkeypox surveillance systems in Nigeria. A comprehensive search in PubMed, PubMed Central and Google Scholar was conducted using search terms including "Monkeypox", "Surveillance", "Response system", "Forms", "Strengthening", "Challenges", and "Nigeria". Supplementary data were also compiled from Nigeria's reports, newsletters, commentaries, policy briefs and other reports and a direct google search. Some relevant data sources are not empirical studies published in peer-reviewed academic journals but policy papers. The inclusion criteria included data sources that provided information regarding forms, challenges, strengths and steps in strengthening the surveillance systems in Nigeria and were published in English between January 2018 and October 2022. On the other hand, the exclusion criterion was any other data sources without information regarding forms, challenges, strengths and strengthening of the surveillance systems in Nigeria. This narrative review was conducted to summarize the forms, strengths and challenges

of the monkeypox surveillance system in Nigeria with a target to proffer solutions towards strengthening it. This independent review of monkeypox in Nigeria will provide significant insights into the theme. The data extracted were discussed narratively and succinctly to explore the study's primary objective.

## Results and Discussion

### *Forms of Surveillance System for Monkeypox Virus*

Indicator-based surveillance in Nigeria is divided into immediate case, weekly, and monthly notifications. The goal is early reporting of any disease outbreak to national health authorities within 24 to 48 hours, to help improve response activities and curb the spread of pathogens. [5] This is a critical approach formulated to address outbreaks via case notification from laboratory testing, self-reporting by an infected person to health authorities, and reporting by local health organizations. Event-based surveillance (EBS) gathered reports, rumours, stories and other relevant information to detect an unexpected event that could signal an outbreak. EBS is mostly centred in the community where unusual public health events are reported by the residents in the community. [6-8]

Laboratory-based surveillance is either virologic or serologic. It is of utmost significance in the surveillance system of monkeypox virus and other pathogenic diseases in the country as it allows the national health authorities to understand the viral pathogens better to stop the outbreak. [6] This method involves the application of the Nucleic Acid Amplification Test (NAAT) using real-time or conventional Polymerase Chain Reaction (PCR) for the detection of unique sequences of the viral DNA. [9] There are currently 39 Federal Teaching Hospitals and 17 Federal Medical Centres with a minimum of 1 state general or specialist across the 36 states, including the Federal Capital Territory. Likewise, 63 out of 85 government-approved laboratories and testing centres across the six geopolitical areas of the country have PCR laboratories for pathogenic diseases. [10]

Mortality surveillance involves reporting and monitoring the number of monkeypox deaths in the community, hospitals, and other sites. [11-13] The number of deaths is recorded daily or

weekly, [6,14] hence hospital-based surveillance is another form of facility-based surveillance that takes place within the hospital. [15]

### *Challenges of the surveillance system in Nigeria*

Numerous activities require expertise for effective surveillance outcomes. The challenges to collecting, analysing, interpreting and disseminating health data to ensure effective and efficient public health decision-making and action have been reported. [16] Getting expertise in all processes involved in public health surveillance has proven to undermine the monkeypox surveillance system in Nigeria. Shortage of highly recommended public health interventions and low standard data transmission have resulted in suboptimal surveillance in the country. [17]

Monkeypox testing capacity has improved in Nigeria following the recent outbreaks. However, there are still some inconsistencies in the surveillance system as health professionals are not capturing the number of monkeypox cases as they ought to, because testing centres are limited and not implemented in all states of the federation. Indeed, only the Federal Capital Territory, Abuja, and NCDC Central Public Health Laboratory in Lagos have are adequately equipped to diagnose monkeypox virus infection in the country. [4] Insufficiency of test kits and power instability are some of the major challenges contributing to poor surveillance in the country. [17]

Stigmatization and misinformation in small communities might translate to affected families being stereotyped, labelled, losing status, and experiencing discrimination, often leading to refraining from seeking help publicly (Timothy Obiezu, <https://www.voanews.com/africa/fear-stigma-keep-nigerians-helping-contact-tracers>;2022). Co-epidemic surveillance burden, which involves COVID-19 and Lassa fever surveillance systems in the country, contributes

to the significant burden of diseases making the total burden of monkeypox virus uncertain. [18] The poor healthcare system is another challenge to monkeypox surveillance in the country. Many government-owned laboratories in the country operate below the WHO standards for laboratory surveillance systems and biosafety due to scarcity of the required resources. Inadequate healthcare facilities and workforce indirectly contribute to Nigeria's weak monkeypox surveillance system. [19]

#### ***Strengths and strengthening the surveillance systems in Nigeria***

Researchers have reported that monkeypox virus is endemic. Still, surveillance should be different from what it is as we do not know how much of the disease is present, and cases of monkeypox in rural areas are not diagnosed. [4] Since the resurgence of the disease in September 2017 in Nigeria, the condition has remained endemic in some parts of the country (high-burden states), recording sporadic cases throughout the year. Added to this is the problem of suboptimal surveillance system. The trend this year, which has shown an increased number of cases in all states of the federation, poses the question of whether the cases existed before this year and if the surveillance system had been missing them. Another factor to consider for the nationwide rise in the number of cases is the improved channel for communication and community engagement for the disease this year.

Professional training and regular training of all healthcare workers on identifying and diagnosing confirmed cases of monkeypox are necessary and expedient to strengthening the monkeypox surveillance system in the country. WHO Interim Guide released in June 2022 revealed a way of fully identifying and diagnosing monkeypox cases which Nigeria needs to emulate to bolster its surveillance system. [20]

Awareness should be raised among communities at risk of transmission and those not at risk, about the associated preventive and

protective measures, as well as the symptoms and signs of monkeypox virus infection. Adequate planning and implementation of interventions to avoid stigma and discrimination against individuals or populations potentially affected by monkeypox virus should be established to prevent further undetected transmission of the virus. Promoting voluntary self-disclosure and care-seeking behaviour to facilitate timely access to quality clinical care and to protect human rights, privacy and dignity of data, subjects and their contacts in all communities, is a crucial goal in strengthening the surveillance system in Nigeria. [21]

The Nigerian government must focus more on investing in health services to strengthen the surveillance systems and bolster preparedness to stem the rapid spread of infectious diseases. [22] The Surveillance Outbreak Response Management and Analysis System (SORMAS), first deployed in response to the 2017 Monkeypox Virus outbreak to improve the timeliness and completeness of case reporting and facilitate the overall response, needs the full support of investment from the Federal government of Nigeria for all resources required to take the surveillance system to the forefront in Africa, especially during the current outbreak. [23,24]

On 26 May 2022, the Nigeria Centre for Disease Control and Prevention (NCDC) activated a Level II National Multisectoral One-health Monkeypox Emergency Operations Centre (MPX-EOC) to strengthen and coordinate ongoing response activities in the country while contributing to the global response and genomic surveillance. [24] This is commendable but more is needed as it was only established in Abuja, the Federal Capital Territory. The Federal Government must put all efforts in place to implement such a response capacity in all states of the federation to strengthen the surveillance. [21]

The Government of Nigeria should intensify efforts to strengthen laboratory capacities, genome sequencing capacities and international sample referral capacity as needed for the diagnosis of monkeypox virus infection and associated surveillance based on the use of nucleic acid amplification assays (NAAT) in all federal health facilities and local health centres in the country. [21]

Coordinated response and countermeasures aimed at strengthening the surveillance system should be implemented to facilitate local and international contact tracing of individuals who have developed signs and symptoms compatible with monkeypox virus infection during travel or upon return. [21] Establishing and activating collaborative One-Health Coordination Effective response to the monkeypox virus outbreak is essential where all stakeholders, members of the community, medical staff (including clinicians and virologists), local, state, and federal officials (including the DSNOs, health officers, health educators, epidemiologists, the NCDC team, environmental health officers, animal monitoring officers), veterinarians, the scientists, development partners and the media all play their roles in strengthening and controlling the surveillance system in Nigeria. [22] Conducting detailed case investigations and studies to characterize transmission patterns, including suspected or documented spill overs from and spillback to animals, is necessary to strengthen the surveillance system. Updating case investigation forms to include information on the full range of possible exposures and modes of zoonotic and human-to-human transmission should be encouraged. [21, 23]

### *Who should fund the strengthening of the surveillance system in Nigeria?*

Funding from the federal government to prepare for epidemics in Nigeria is no longer an option but a necessity given the continued emergence of disease outbreaks such as the yet-to-be-conquered COVID-19, Lassa fever, cholera, yellow fever, measles, monkeypox and meningitis resurgences (Anthonia Obokoh, <https://www.google.com/amp/s/businessday.ng/amp/health/article/epidemic-preparedness-leadership-increased-funding-strengthens-health-systems/>, 2022).

[y.ng/amp/health/article/epidemic-preparedness-leadership-increased-funding-strengthens-health-systems/](https://www.google.com/amp/health/article/epidemic-preparedness-leadership-increased-funding-strengthens-health-systems/); 2022). As of 01 June 2022, the federal government of Nigeria has urged veterinary epidemiologists, field monitors, and veterinarians to step up surveillance activities to detect possible cases of monkeypox in animals (<https://guardian.ng/news/monkey-pox-fg-wants-veterinary-epidemiology-officers-others-to-step-up-surveillance/>, 2022) which is primarily funded by the federal government. [25]

The World Health Organization (WHO) is working closely with African countries, regional institutions, and technical and financial partners to provide support and efforts to strengthen laboratory diagnostics, disease surveillance, preparedness, and response to prevent further infection. The organization also provides expertise through key technical guidance on testing, clinical care, prevention and control of illness, informing and educating the public about monkeypox and its risks and working with communities to support disease control efforts. Developing a pool of domestic funds such as the CACOVID and other organizations that have been supportive during the COVID-19 outbreak will help the country avoid dependence on international funding agencies. Building strong partnerships with private and other semi-governmental agencies will create options for increasing and providing resources for preparedness (Anthonia Obokoh, <https://www.google.com/amp/s/businessday.ng/amp/health/article/epidemic-preparedness-leadership-increased-funding-strengthens-health-systems/>, 2022).

### *Should Nigeria be worried?*

Nigerians should be apprehensive because failure to detect and report all cases of monkeypox promptly means the disease will spread and may cause death in at least one in ten immune-compromised individuals infected. [24] The West African strain of monkeypox virus is generally a mild infection

for most people. Still, those infected and their contacts must be identified early. This depends on the solid surveillance system in Nigeria because the virus is more of a problem in vulnerable individuals such as those with compromised immune systems or pregnant women. [25] Another cause of concern is that there is no specific treatment or vaccine for monkeypox infection available in the country. [21]

## Conclusion

There are several surveillance systems in Nigeria; these include the primary forms such as indicator-based, event-based, contact tracing, laboratory-based, sero-surveillance, and mortality surveillance. Insufficient monkeypox testing capacities, inconsistent power supply, stigmatization and discrimination, and poor health systems are the major challenges to the surveillance system in Nigeria. The Nigerian government and national health authorities must focus on investing in their surveillance systems and bolster the preparedness to stem the rapid spread of infectious diseases. This can be achieved by training all healthcare providers, improving increased awareness and curbing stigmatization and discrimination. Implementation of coordinated response, collaborative efforts, and establishing operational channels between authorities to facilitate local and international contact tracing of individuals who have developed signs and symptoms compatible with monkeypox virus infection during travel or upon return are essential. It is recommended that the Federal Government of Nigeria and all national health authorities continue to devise and implement the Integrated Disease Surveillance and Response (IDSR) framework and tackle all the challenges monkeypox virus infection surveillance is facing in Nigeria using systematic and orderly proven strategies to ensure effective monkeypox virus response. Capacity development in data analysis,

surveillance data interpretation and quality data management are of utmost importance.

**Acknowledgement:** The authors appreciate the Global Health Focus and Dr Pius Omoruyi Omosigho for the timely and unusual support in the form of supervision and expert advice.

**Authors' Contributions:** ONO, OOJ, ASM, OMO, MEE conceived and designed the study, did literature review, and drafted the manuscript. DLP, OTM, ABG, IAA and EM revised the draft manuscript for sound intellectual content and approved the final version of the manuscript.

**Conflict of Interest:** None declared.

**Funding:** Self-funded.

**Publication History:** Submitted 29 November 2022; Accepted 23 December 2022.

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