

Management of mpox in Africa: Ongoing threat and epidemiological insights

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ABSTRACT

The spread of mpox across Africa continues to be a public health threat due to frequent outbreaks, growing geographic range, virulent new strains and incompetent health systems. The more outbreaks that are occurring, the more there is a need to have coordinated efforts that combine epidemiological monitoring, early diagnosis, adequate clinical management, prevention of infection, vaccination, and community involvement. The epidemiology of mpox in Africa is explored in this paper, covering transmission dynamics, vulnerable groups, and causes of the maintenance and spread of the disease. It also reviews existing diagnostic and treatment methods and interventions in public health undertaken in the affected countries, and establishes barriers, including low laboratory capacity, weak surveillance system, vaccine shortages and cross-border transmission. The study also examines the importance of regional preparedness and response collaboration, One Health approaches and evidence-based policy-making in enhancing preparedness and outbreak response. There is a strong focus on building resilient health systems with a speedy, effective containment and sustainable disease management. The paper culminates a synthesis of recent evidence and public health experience to provide a comprehensive understanding of the current situation in Africa regarding the threat of mpox and presents strategic recommendations to enhance the prevention, surveillance, clinical management and response preparedness for mpox. The findings are designed to assist policy makers, health-care providers and researchers towards strengthening coordinated response to minimize burden of mpox and overall health security in the continent.

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INTRODUCTION

Monkeypox (also known as mpox) is a zoonotic viral illness caused by the monkeypox virus, a close relative of the variola virus which causes smallpox. mpox is now a major public health threat because of the increase in cases, geographical distribution and the changing transmission patterns of the virus, even though it was once thought only to occur in a few countries of

Central and West Africa. Recent outbreaks have shown that mpox is no longer limited to rural areas of the world and its spread has a significant potential impact on health security at the regional and global level. The resurgence of mpox has intensified concerns regarding outbreak preparedness, healthcare system resilience, and the effectiveness of current prevention and response strategies (Bhat et al., 2023; Titanji et al., 2024).

The transmission of mpox continues to occur most

Table 1: Summary of Epidemiological Characteristics of Mpox in Africa

<i>Epidemiological Parameter</i>	<i>Current Characteristics</i>	<i>Public Health Significance</i>
Geographic distribution	Predominantly Central and West Africa with expansion into additional African regions	Indicates increasing regional spread requiring coordinated surveillance
Primary viral reservoirs	Rodents and small mammals with occasional transmission from non-human primates	Supports implementation of One Health surveillance and wildlife monitoring
Major transmission routes	Zoonotic exposure, direct human-to-human contact, respiratory droplets during prolonged exposure, contaminated materials, and healthcare-associated transmission	Necessitates comprehensive infection prevention and community education
High-risk populations	Healthcare workers, hunters, wildlife handlers, rural communities, immunocompromised individuals, children, and pregnant women	Enables targeted prevention and vaccination strategies
Contributing risk factors	Deforestation, wildlife interaction, urbanization, poverty, migration, conflict, weak surveillance systems	Highlights need for multisectoral public health interventions
Emerging epidemiological trends	Increasing outbreaks, wider geographic spread, sustained community transmission, emergence of viral variants	Requires enhanced genomic surveillance and rapid outbreak response
Surveillance challenges	Underreporting, limited laboratory capacity, delayed diagnosis, inadequate contact tracing	Reduces effectiveness of outbreak containment and disease control
Recommended strategic response	Strengthened surveillance, laboratory expansion, One Health implementation, regional collaboration, vaccination preparedness	Improves outbreak preparedness and long-term disease control

frequently in Africa, where regular outbreaks are increasingly testing already overwhelmed health services. The rise in the disease burden has been driven by many factors, including population movement, changes in the environment, encroachment of humans on wildlife habitats, poor surveillance networks and limited access to diagnostic and treatment facilities. Moreover, the identification of new variants and the potential for continued human-to-human transmission has made public health measures more challenging, emphasizing the need for coordinated and coordinated measures to control the disease (Nachega et al., 2024; Verma et al., 2024). The changing epidemiology of mpox highlights the need for a comprehensive approach to managing mpox that goes beyond clinical care to encompass surveillance, risk communication, vaccination, and international collaboration.

There have been significant changes in the epidemiology of mpox in recent years. Transmission was previously thought to be mainly via animal to person spread including contact with infected rodents and non-human primates. Recent outbreaks have shown that there is more transmission between humans via direct contact with infectious lesions, respiratory secretions, contaminated materials and close physical contact. Disease spread has also been accelerated within and outside endemic areas, due to urbanization, increased international travel and socioeconomic differences. All of this highlights the importance of ongoing epidemiological surveillance and flexible public health interventions that would be capable of adapting to evolving transmission dynamics (Mohapatra et al., 2024; Kumar et al., 2024).

The management of mpox has also grown more complicated with the variety of clinical features seen in recent outbreaks.

Most patients will develop a self-limited disease with fever, lymphadenopathy, and pustules on the skin; however, more serious complications can result in immunocompromised individuals, pregnant women, and children. Early diagnosis via molecular diagnostic techniques, appropriate clinical management, supportive care, and access to antiviral drugs are still critical in controlling the disease. Despite efforts of many African countries in this regard, however, there are still some countries where the labs, trained staff, and medical resources are still lacking, reducing the capacity to detect and respond quickly to outbreaks (Titanji et al., 2024; Kumar et al., 2024).

Prevention and control of mpox require integrated public health strategies that combine surveillance, vaccination, infection prevention, community engagement, and international cooperation. Lessons learned from previous infectious disease emergencies, particularly the COVID-19 pandemic, have demonstrated the importance of early detection, transparent risk communication, coordinated policy implementation, and equitable access to healthcare resources. Strengthening laboratory networks, enhancing genomic surveillance, improving healthcare workforce capacity, and adopting One Health approaches that recognize the interconnectedness of human, animal, and environmental health are increasingly recognized as essential elements of sustainable mpox management (Enitan et al., 2024; Mohamed Abdoul-Latif et al., 2024; World Health Organization, 2024).

The World Health Organization has emphasized the importance of comprehensive strategic frameworks that prioritize surveillance, preparedness, vaccination, case management, and regional collaboration to reduce the burden of mpox across Africa. Effective implementation of these

strategies requires strong governance, adequate financing, multisectoral partnerships, and continuous research to address evolving epidemiological challenges. Additionally, strengthening public awareness and community participation remains critical for improving early case detection, reducing stigma, and encouraging timely healthcare-seeking behaviors (World Health Organization, 2024; Musuka et al., 2024).

This paper examines the management of mpox in Africa by exploring its evolving epidemiology, transmission dynamics, clinical presentation, diagnostic approaches, prevention strategies, treatment options, and health system preparedness. It further evaluates the major challenges affecting disease control and highlights evidence-based recommendations for strengthening surveillance systems, improving outbreak response, and enhancing regional collaboration. Through an integrated review of current epidemiological evidence and public health practices, the study aims to provide practical insights that support effective and sustainable management of mpox across the African continent (Nachega et al., 2024; Musuka et al., 2024; Titanji et al., 2024).

EPIDEMIOLOGY AND TRANSMISSION DYNAMICS OF MPOX IN AFRICA

Mpox remains one of the most significant re-emerging zoonotic diseases affecting the African continent, with increasing outbreaks highlighting persistent public health vulnerabilities. Although historically confined to Central and West Africa, the epidemiological landscape has evolved considerably due to changes in viral transmission patterns, ecological disturbances, increased human mobility, and improved surveillance systems. Recent outbreaks have demonstrated sustained human-to-human transmission alongside traditional zoonotic spread, resulting in expanded geographic distribution and heightened concern among public health authorities (Nachega et al., 2024; Musuka et al., 2024).

The epidemiology of mpox is shaped by complex interactions among viral evolution, environmental factors, socioeconomic conditions, and healthcare infrastructure. Historically, endemic countries such as the Democratic Republic of the Congo (DRC), Nigeria, Cameroon, Central African Republic, Republic of the Congo, and Gabon have reported the majority of confirmed cases. However, increasing reports from previously unaffected regions suggest that the disease is expanding beyond traditional endemic zones. Population displacement, rapid urbanization, deforestation, climate change, and increased interaction between humans and wildlife have created favorable conditions for sustained viral transmission (Musuka et al., 2024; Mohamed Abdoul-Latif et al., 2024).

The emergence of newly identified viral variants has further complicated the epidemiological profile of mpox. Genetic mutations have raised concerns regarding enhanced transmissibility, altered clinical presentation, and the potential for prolonged community transmission. Although the exact impact of these genetic changes continues to be investigated, available evidence suggests that viral evolution may influence

outbreak magnitude and public health response strategies. Continuous genomic surveillance has therefore become an essential component of outbreak monitoring across Africa (Verma et al., 2024; Kumar et al., 2024).

Transmission dynamics have shifted considerably over recent outbreaks. Traditionally, zoonotic transmission occurred through direct contact with infected rodents, non-human primates, or contaminated animal products. Hunting, handling bushmeat, and exposure to infected wildlife remain important risk factors in endemic communities. However, recent outbreaks demonstrate that sustained human-to-human transmission has become increasingly important, particularly through direct skin-to-skin contact, respiratory secretions during prolonged close interactions, contaminated fomites, and intimate physical contact. Healthcare-associated transmission has also been documented where infection prevention and control measures are inadequate (Titanji et al., 2024; Mohapatra et al., 2024).

Several demographic and socioeconomic factors influence disease transmission across Africa. Communities experiencing poverty, overcrowded living conditions, inadequate sanitation, limited healthcare access, and weak surveillance systems are disproportionately affected. Rural populations remain vulnerable because of close interaction with wildlife reservoirs, while densely populated urban settings facilitate rapid person-to-person spread once the virus enters communities. Cross-border population movement, migration, humanitarian crises, and regional conflicts further complicate surveillance and containment efforts by increasing opportunities for disease dissemination across national boundaries (Nachega et al., 2024; Enitan et al., 2024).

Age distribution and occupational exposure also contribute significantly to disease epidemiology. Individuals involved in wildlife trade, hunting, farming, forestry, and healthcare services often experience elevated exposure risks. Immunocompromised individuals, children, pregnant women, and persons with underlying chronic diseases remain at increased risk of severe clinical outcomes. The changing epidemiological profile underscores the importance of targeted surveillance among vulnerable populations and high-risk occupational groups (Titanji et al., 2024; Kumar et al., 2024).

The persistence of mpox outbreaks also reflects substantial weaknesses within disease surveillance systems across many African countries. Limited laboratory diagnostic capacity, delayed case reporting, inadequate contact tracing, insufficient epidemiological workforce, and fragmented health information systems reduce the effectiveness of outbreak detection and response. Underreporting remains a major challenge, particularly in rural and conflict-affected regions where healthcare infrastructure is weak. The World Health Organization emphasizes strengthening integrated surveillance systems, laboratory networks, and cross-border collaboration to improve early detection and rapid outbreak containment (World Health Organization, 2024).

Environmental changes continue to influence transmission dynamics. Deforestation, biodiversity loss, agricultural

expansion, and increasing encroachment into wildlife habitats increase opportunities for zoonotic spillover events. Climate variability may also alter reservoir distribution and human-animal interactions, contributing to changing patterns of disease emergence. These ecological factors reinforce the importance of adopting a One Health framework that integrates human, animal, and environmental health surveillance into comprehensive mpox control strategies (Musuka et al., 2024; Mohamed Abdoul-Latif et al., 2024).

The epidemiological evidence demonstrates that mpox has transitioned from an occasionally reported zoonotic disease to a recurring public health threat requiring sustained surveillance, coordinated regional collaboration, robust laboratory capacity, and comprehensive preparedness planning. Strengthening surveillance systems, expanding genomic monitoring, improving risk communication, and investing in resilient public health infrastructure remain fundamental to reducing disease transmission and mitigating future outbreaks across Africa (Nachega et al., 2024; World Health Organization, 2024; Bhat et al., 2023).

CLINICAL PRESENTATION, DIAGNOSIS, AND DISEASE BURDEN

Clinical Presentation

Mpox is a zoonotic viral disease caused by the monkeypox virus, an Orthopoxvirus closely related to the variola virus. Although historically characterized by localized outbreaks in Central and West Africa, the disease has evolved into a broader public health concern with increasing human-to-human transmission and changing clinical manifestations. The incubation period generally ranges from 5 to 21 days, followed by a prodromal phase characterized by fever, headache, fatigue, myalgia, chills, and prominent lymphadenopathy, which remains one of the distinguishing clinical features separating mpox from other vesiculopustular diseases such as smallpox and chickenpox (Titanji et al., 2024; Kumar et al., 2024).

The characteristic rash typically progresses through sequential stages, including macules, papules, vesicles, pustules, and crusts before complete healing. Lesions may appear on the face, extremities, palms, soles, oral mucosa, genital regions, and perianal areas, with lesion distribution varying according to the route of transmission. Recent outbreaks have demonstrated atypical clinical presentations, including localized genital lesions, anorectal pain, proctitis, and minimal prodromal symptoms, making diagnosis increasingly challenging in clinical practice (Titanji et al., 2024; Verma et al., 2024).

Clinical severity varies considerably depending on patient age, immune status, nutritional condition, and underlying comorbidities. While many infections remain self-limiting, severe disease may occur among immunocompromised individuals, pregnant women, children, and persons with advanced HIV infection. Complications including secondary bacterial infections, pneumonia, encephalitis, keratitis, myocarditis, and sepsis contribute substantially to morbidity

and mortality, particularly in resource-limited settings where delayed diagnosis and inadequate supportive care remain common (Mohapatra et al., 2024; Mohamed Abdoul-Latif et al., 2024).

Furthermore, recent evidence suggests that emerging viral variants may influence disease presentation, transmission efficiency, and clinical outcomes, emphasizing the need for continuous surveillance and adaptation of clinical management protocols across African healthcare systems (Verma et al., 2024; Musuka et al., 2024).

Diagnostic Approaches

Timely and accurate diagnosis remains fundamental for effective mpox management, outbreak containment, and interruption of transmission chains. Because the clinical presentation overlaps with several infectious diseases including chickenpox, herpes simplex virus infection, syphilis, measles, bacterial skin infections, and other rash-associated illnesses laboratory confirmation is essential for definitive diagnosis (Titanji et al., 2024).

Real-time polymerase chain reaction (RT-PCR) testing of lesion material remains the gold standard for laboratory confirmation because of its high sensitivity and specificity. Samples obtained from vesicular fluid, pustular fluid, lesion crusts, or skin swabs provide the highest diagnostic yield. Additional molecular approaches, including genomic sequencing, have become increasingly valuable for identifying circulating viral clades, monitoring viral evolution, and supporting epidemiological investigations during outbreaks (Kumar et al., 2024; Verma et al., 2024).

Serological testing has limited diagnostic value because of antibody cross-reactivity among Orthopoxviruses and the inability to distinguish between previous vaccination and active infection. Viral culture and electron microscopy are useful primarily in specialized reference laboratories but are less practical for routine diagnosis because of biosafety requirements and limited accessibility (Titanji et al., 2024).

Many African countries continue to experience substantial diagnostic challenges resulting from inadequate laboratory infrastructure, shortages of molecular testing equipment, limited specimen transportation networks, insufficient laboratory personnel, and delayed reporting systems. These limitations often prolong outbreak detection, reduce the effectiveness of contact tracing, and contribute to continued community transmission. Strengthening decentralized laboratory capacity, expanding genomic surveillance, and improving integrated disease surveillance systems remain essential priorities for effective outbreak management (World Health Organization, 2024; Nachega et al., 2024).

In addition, digital disease surveillance platforms, integrated laboratory information systems, and regional genomic surveillance networks have emerged as valuable tools for improving early detection, facilitating rapid information sharing, and supporting coordinated public health responses across African countries (Enitan et al., 2024; Musuka et al., 2024).

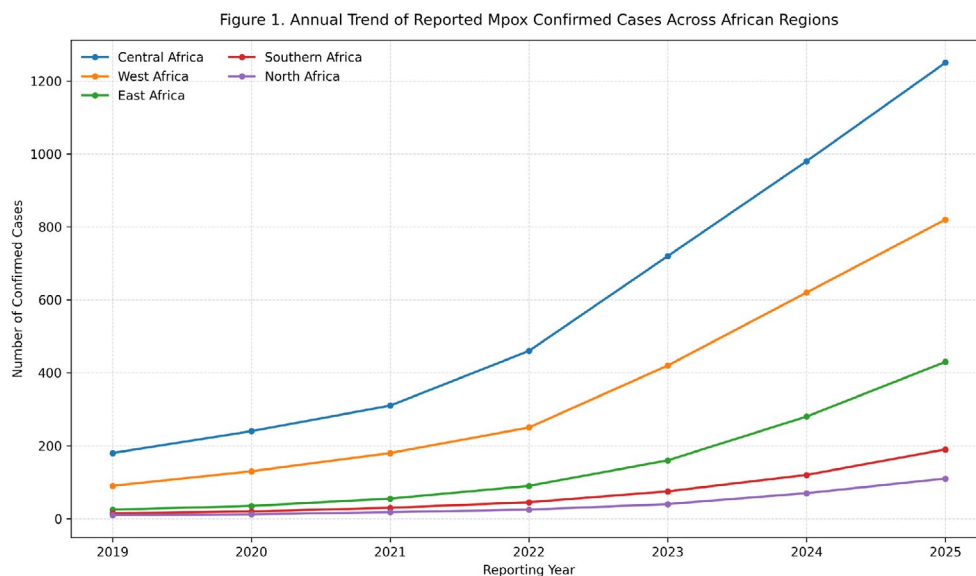


Fig 1: The figure illustrates the annual trend in reported confirmed mpox cases across major African regions. Values are presented for comparative visualization of regional incidence, geographic expansion, and outbreak frequency and should be interpreted alongside officially reported epidemiological surveillance data.

Disease Burden

Mpox continues to impose a significant public health burden across Africa through its direct health effects, pressure on healthcare systems, and socioeconomic consequences. Endemic countries have experienced recurrent outbreaks with increasing geographic spread, while previously unaffected regions have reported imported and locally transmitted cases. Population mobility, environmental changes, increased human-wildlife interactions, and inadequate surveillance systems have contributed to the persistence and expansion of outbreaks (Nachega et al., 2024; Musuka et al., 2024).

Healthcare systems face considerable challenges due to increased demand for clinical care, laboratory services, isolation facilities, infection prevention resources, and public health surveillance activities. During outbreaks, healthcare workers require specialized training in case recognition, specimen collection, infection prevention, and clinical management, placing additional strain on already limited health resources. In many rural and underserved communities, shortages of trained personnel, diagnostic equipment, and medical supplies hinder effective response efforts (World Health Organization, 2024; Enitan et al., 2024).

The disease also produces significant economic consequences through productivity losses, healthcare expenditures, interruption of trade and travel, reduced workforce participation, and increased financial pressure on households. Stigma associated with mpox infection may discourage healthcare seeking, delay diagnosis, and negatively affect mental health and community acceptance of public health interventions. These indirect consequences further complicate outbreak control efforts and highlight the need for comprehensive community engagement strategies (Mohamed Abdoul-Latif et al., 2024; Bhat et al., 2023).

The burden of mpox extends beyond clinical illness by exposing persistent weaknesses in surveillance infrastructure, emergency preparedness, vaccine accessibility, laboratory capacity, and cross-border coordination. The emergence of new viral variants and expanding transmission networks underscore the importance of sustained investment in surveillance systems, research, healthcare infrastructure, and regional collaboration. Strengthening integrated disease surveillance, improving diagnostic accessibility, enhancing healthcare workforce capacity, and adopting One Health approaches will be essential for reducing disease burden and improving preparedness for future outbreaks across Africa (World Health Organization, 2024; Mohapatra et al., 2024; Nachega et al., 2024).

PREVENTION, TREATMENT, AND PUBLIC HEALTH MANAGEMENT

Effective management of mpox in Africa requires an integrated approach that combines prevention, early detection, clinical care, vaccination, infection prevention and control (IPC), community engagement, and coordinated public health surveillance. The persistence of transmission in several African settings demonstrates that clinical interventions alone are insufficient; sustainable control depends on strengthening health systems and addressing social, environmental, and epidemiological factors that facilitate transmission (Nachega et al., 2024; Musuka et al., 2024).

Prevention and Infection Prevention and Control

Prevention remains a central component of mpox control because transmission can occur through close physical contact with infected individuals, contaminated materials, respiratory exposure during prolonged close contact, and zoonotic interactions. Preventive measures therefore include early

identification and isolation of suspected cases, appropriate use of personal protective equipment (PPE), environmental cleaning, safe handling of contaminated materials, and education on reducing close contact with infected persons (Bhat et al., 2023; Mohapatra et al., 2024).

Healthcare facilities require strengthened IPC protocols to protect healthcare workers and prevent healthcare-associated transmission. Suspected and confirmed patients should be appropriately managed, while healthcare personnel should receive training on recognition of clinical manifestations, specimen handling, PPE use, and infection-control procedures. These measures are particularly important in resource-constrained African health systems where overcrowding, inadequate isolation facilities, and shortages of protective equipment can increase transmission risks (Musuka et al., 2024; World Health Organization, 2024).

Community-based prevention is equally important. Risk communication should provide clear, culturally appropriate information concerning symptoms, transmission routes, prevention practices, and when to seek medical attention. Public health messaging should avoid stigmatization because fear, misinformation, and discrimination may discourage symptomatic individuals from accessing healthcare or disclosing relevant exposure histories (Enitan et al., 2024; Mohamed Abdoul-Latif et al., 2024).

Vaccination Strategies

Vaccination represents an important component of comprehensive mpox prevention, particularly for individuals at increased risk of exposure and populations affected by sustained transmission. Strategic vaccination should be guided by epidemiological surveillance and risk assessment, with priority given to populations and geographic areas where the likelihood of exposure is greatest (World Health Organization, 2024).

However, equitable vaccine access remains a major challenge for African countries. Limited vaccine availability, logistical constraints, financing requirements, cold-chain considerations, and difficulties reaching populations in remote areas can restrict the effectiveness of vaccination programs. Consequently, vaccination strategies should be integrated with surveillance, community mobilization, case investigation, and other prevention measures rather than implemented as an isolated intervention (Nachega et al., 2024; Musuka et al., 2024).

Clinical Management and Treatment

Clinical management focuses on supportive care, symptom control, prevention of complications, and appropriate management of patients with severe disease or increased risk of adverse outcomes. Most patients require monitoring of symptoms, hydration and nutrition support, pain management, and management of skin and mucosal lesions. Patients with complications or severe manifestations may require hospitalization and multidisciplinary clinical care (Titanji et al., 2024).

Certain populations may require closer monitoring because of increased risks associated with disease severity or complications. Clinical assessment should therefore consider age, immune status, pregnancy, underlying medical conditions, extent of lesions, and involvement of critical anatomical sites. Prompt recognition of complications is essential for preventing avoidable morbidity and mortality (Titanji et al., 2024; Kumar et al., 2024).

Antiviral and investigational therapeutic approaches have generated considerable interest, but availability, regulatory status, clinical evidence, and access vary between settings. Treatment decisions should consequently be based on applicable national or international clinical guidance, disease severity, patient characteristics, and available healthcare resources. Strengthening African clinical research capacity is also important for generating locally relevant evidence concerning treatment effectiveness and outcomes (Titanji et al., 2024; Kumar et al., 2024).

Surveillance, Case Detection, and Contact Management

Effective prevention and treatment depend on the ability to detect cases rapidly. Surveillance systems should combine facility-based reporting, laboratory surveillance, community-based detection, contact tracing, and epidemiological investigation. Early identification enables timely isolation and treatment while reducing opportunities for onward transmission (Nachega et al., 2024).

Contact identification and follow-up are particularly important during outbreaks. Individuals exposed to confirmed cases should receive appropriate information about symptoms, preventive measures, and procedures for accessing healthcare if symptoms develop. Cross-border surveillance and information sharing are also necessary because population movement can facilitate transmission between neighboring countries (Mohapatra et al., 2024; World Health Organization, 2024).

One Health and Community-Based Management

Mpox management in Africa should incorporate a One Health perspective because transmission may involve interactions between humans, animals, and environmental conditions. Strengthening collaboration among public health authorities, veterinary services, environmental agencies, laboratories, and community organizations can improve understanding of zoonotic transmission and support coordinated interventions (Musuka et al., 2024).

Community participation is essential for sustainable outbreak management. Local leaders, healthcare workers, civil society organizations, and community health workers can support risk communication, early case identification, referral, and adherence to preventive measures. Lessons from the COVID-19 response further demonstrate the importance of transparent communication, public trust, coordinated governance, and flexible health-system responses during infectious disease emergencies (Enitan et al., 2024; Mohamed

The integrated approach presented in Table 1 emphasizes that no single intervention is sufficient to control mpox.

Table 2: Integrated Prevention, Treatment, and Public Health Management Strategies for Mpox in Africa (Abdoul-Latif et al., 2024).

<i>Management Component</i>	<i>Key Interventions</i>	<i>Major Implementation Considerations</i>	<i>Expected Public Health Outcome</i>
Surveillance	Case detection, laboratory confirmation, epidemiological investigation, contact tracing	Strengthen reporting systems, laboratory networks, and cross-border information sharing	Earlier detection and interruption of transmission
Infection prevention and control	Isolation, PPE, environmental disinfection, safe specimen handling	Address shortages of PPE, isolation facilities, and trained personnel	Reduced healthcare-associated transmission
Vaccination	Risk-based vaccination and targeted immunization of priority populations	Improve vaccine availability, financing, logistics, and equitable distribution	Reduced infection and severe disease among high-risk groups
Clinical management	Supportive care, pain management, hydration, complication management, appropriate therapeutics	Improve clinical training, referral systems, and access to treatment	Reduced complications, morbidity, and mortality
Community engagement	Health education, risk communication, stigma reduction, community-based detection	Use culturally appropriate and trusted communication channels	Improved prevention behavior and healthcare-seeking
One Health	Human, animal, and environmental surveillance and collaboration	Strengthen intersectoral coordination and zoonotic surveillance	Improved control of zoonotic transmission
Regional cooperation	Cross-border surveillance, data sharing, coordinated outbreak response	Establish sustainable regional preparedness mechanisms	Reduced risk of international and cross-border spread
Research and preparedness	Therapeutic studies, vaccine research, genomic surveillance, operational research	Increase African research capacity and sustainable funding	Stronger evidence-based preparedness and response

Surveillance provides the foundation for identifying transmission patterns, while vaccination, IPC, clinical management, community engagement, and One Health interventions address different stages of the transmission and disease-control pathway. This integrated strategy is consistent with the WHO strategic framework and recommendations emphasizing coordinated prevention, preparedness, and response (World Health Organization, 2024).

Strategic Public Health Management

A sustainable mpox response requires African health systems to transition from reactive outbreak management toward continuous preparedness. This includes maintaining functional surveillance systems between outbreaks, expanding diagnostic networks, developing trained healthcare workforces, improving access to vaccines and therapeutics, and establishing clear outbreak-response protocols (Nachega et al., 2024; Verma et al., 2024).

Emerging viral variants and changing transmission patterns further reinforce the need for genomic surveillance and adaptable response strategies. Continuous monitoring can support the identification of epidemiological changes and inform decisions concerning vaccination, diagnostics, clinical management, and public health interventions (Verma et al., 2024; Mohapatra et al., 2024).

Ultimately, effective mpox management requires a coordinated framework in which prevention, clinical care, surveillance, vaccination, community engagement, and regional preparedness operate as interconnected components.

Such an approach can improve outbreak detection, reduce transmission, protect vulnerable populations, and strengthen Africa’s capacity to respond to future infectious disease emergencies (World Health Organization, 2024; Enitan et al., 2024).

CHALLENGES, EMERGING THREATS, AND HEALTH SYSTEM PREPAREDNESS

The management of mpox in Africa continues to face interconnected epidemiological, clinical, logistical, and health-system challenges. Although improvements in surveillance and outbreak response have increased awareness of the disease, many African countries still experience limitations in diagnostic infrastructure, healthcare capacity, vaccine availability, and timely access to therapeutics. These weaknesses can delay case detection and facilitate continued community and cross-border transmission. Nachega et al. (2024) emphasize the urgency of strengthening African-led preparedness and response mechanisms as mpox continues to pose a substantial regional threat.

Weak Surveillance and Case Detection

Effective mpox control depends on timely identification, notification, investigation, and isolation of suspected cases. However, surveillance systems in several African settings remain constrained by inadequate laboratory networks, limited disease-reporting infrastructure, shortages of trained personnel, and inconsistent collection of epidemiological data. These limitations can result in underdiagnosis and

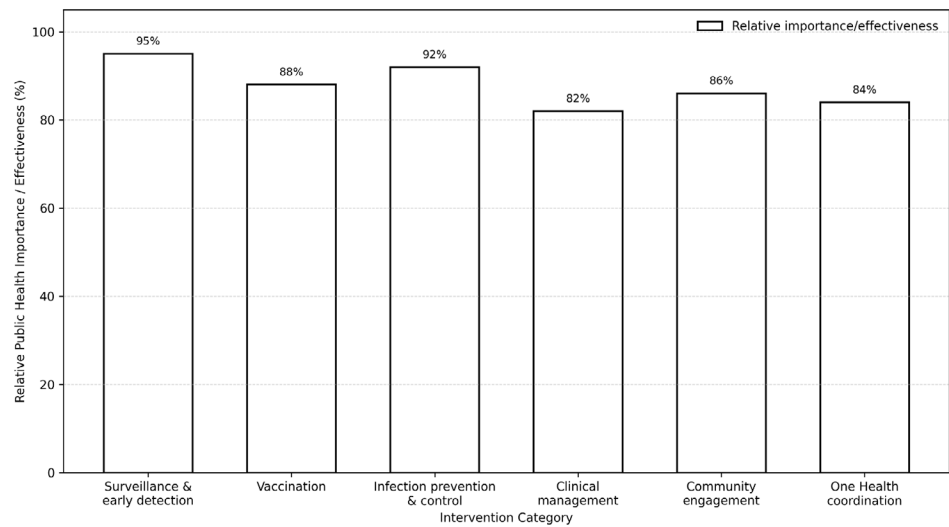


Fig 2: Percentages represent the relative public health importance/effectiveness assigned to major mpox management interventions. The values are illustrative comparative estimates intended to demonstrate the relative contribution of surveillance, vaccination, infection prevention and control, clinical management, community engagement, and One Health coordination.

underreporting, making it difficult to accurately determine the geographical distribution and magnitude of outbreaks. Musuka et al. (2024) identify weaknesses in surveillance and outbreak detection as important barriers to effective mpox prevention and control.

Strengthening integrated disease surveillance should therefore remain a central preparedness priority. Surveillance

systems should incorporate community-level reporting, contact tracing, laboratory confirmation, genomic surveillance, and cross-border information sharing. The WHO Strategic Framework emphasizes integrated surveillance and risk-based approaches as important components of sustainable mpox prevention and control (World Health Organization, 2024).

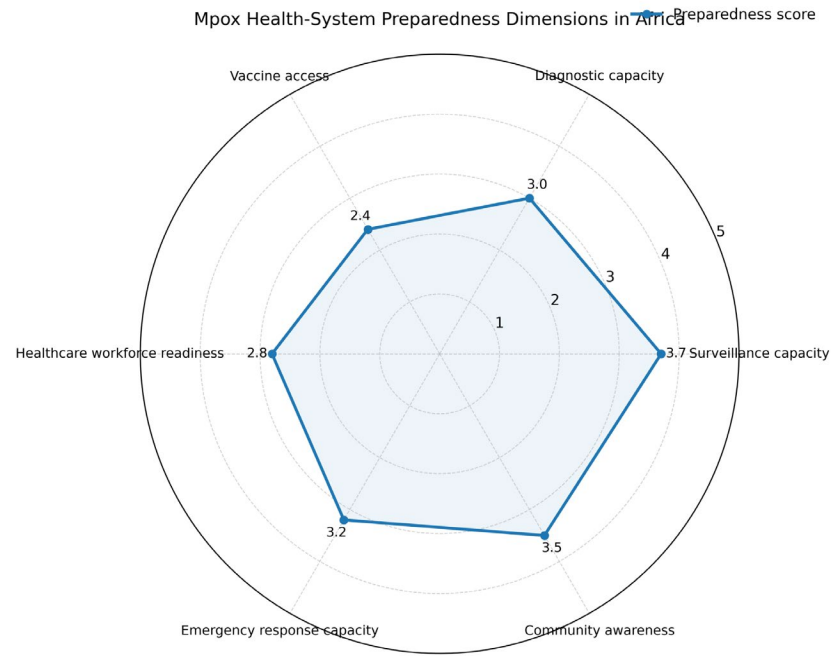


Fig 3: Preparedness scores are measured on a standardized 1–5 scale, where 1 = very low preparedness and 5 = very high preparedness. The scores provide an illustrative assessment of key health-system preparedness dimensions and are intended to highlight areas requiring strategic strengthening.

Table 3: Major Challenges and Recommended Strategic Responses for Mpox Management in Africa

<i>Major Challenge</i>	<i>Potential Public Health Impact</i>	<i>Strategic Response</i>
Weak surveillance systems	Delayed outbreak detection and underreporting	Strengthen integrated surveillance, case notification, contact tracing, and community-based reporting
Limited diagnostic capacity	Delayed confirmation and inappropriate case management	Expand molecular testing, laboratory networks, specimen transportation, and quality assurance
Unequal vaccine availability	Reduced ability to prevent transmission and protect high-risk populations	Establish equitable procurement, strategic stockpiles, regional supply mechanisms, and local production capacity
Limited access to therapeutics	Increased clinical management challenges	Improve access to appropriate therapeutics, supportive care, and trained clinical personnel
Emerging viral variants	Potential changes in transmission and disease patterns	Expand genomic surveillance, sequencing capacity, and international data sharing
Cross-border transmission	Continued spread between neighboring countries	Establish coordinated regional surveillance, notification, and response mechanisms
Health workforce limitations	Reduced outbreak response and clinical capacity	Provide continuous training in diagnosis, infection prevention, surveillance, and case management
Stigma and misinformation	Delayed healthcare seeking and incomplete contact disclosure	Implement culturally appropriate risk communication and community engagement
Weak infection-prevention infrastructure	Increased healthcare-associated transmission	Strengthen IPC protocols, PPE availability, isolation capacity, and facility preparedness
Limited research capacity	Evidence gaps concerning transmission, treatment, and prevention	Promote African-led research, clinical studies, genomic research, and international collaboration
Fragmented health-system coordination	Inefficient allocation and duplication of response activities	Establish multisectoral coordination mechanisms and One Health preparedness frameworks
Funding constraints	Reduced sustainability of preparedness programs	Develop long-term domestic and international financing mechanisms

Diagnostic and Laboratory Capacity Constraints

Limited access to reliable diagnostic testing represents another major challenge. Mpox can present with variable clinical manifestations, while its symptoms may overlap with other infectious diseases. Consequently, clinical assessment alone may not always provide sufficient certainty for appropriate case identification and management. Molecular testing, particularly polymerase chain reaction-based approaches, remains important for laboratory confirmation, but access to testing facilities and specimen transportation can be restricted in resource-constrained settings (Titanji et al., 2024; Kumar et al., 2024).

The geographical concentration of advanced laboratories in major urban centers may further contribute to delays in diagnosis for rural and remote populations. Expanding decentralized diagnostic capacity, improving specimen transportation networks, strengthening laboratory quality assurance, and increasing access to molecular and genomic testing would enhance early detection. Improved diagnostic capacity would also support more accurate epidemiological assessments and facilitate identification of emerging viral variants (Verma et al., 2024).

Vaccine and Therapeutic Access

Equitable access to vaccines and therapeutics remains a significant preparedness concern. African countries affected by mpox may experience difficulties obtaining sufficient quantities of vaccines, antiviral medicines, and other essential medical supplies. Such limitations can reduce the effectiveness of outbreak containment, particularly when transmission occurs rapidly or affects populations with increased vulnerability.

The availability of effective clinical management options must also be accompanied by appropriate healthcare infrastructure and trained personnel. Titanji et al. (2024) highlight the importance of appropriate diagnosis, clinical assessment, supportive care, and therapeutic decision-making in mpox management. Similarly, Kumar et al. (2024) emphasize continuing advances in diagnostic and therapeutic strategies while recognizing the need for appropriate implementation within healthcare systems.

A sustainable response therefore requires mechanisms for regional procurement, strategic stockpiling, technology transfer, local or regional vaccine-production capacity, and equitable distribution of medical countermeasures. These measures are consistent with the broader preparedness and response priorities outlined by the World Health Organization (2024).

Emerging Variants and Changing Transmission Patterns

The emergence and geographical spread of different mpox viral lineages present an additional challenge. Changes in viral epidemiology may affect transmission patterns, clinical presentation, geographic distribution, and the populations most affected. Verma et al. (2024) describe the emergence of new challenges associated with mpox variants and emphasize the importance of continued vigilance.

Genomic surveillance is therefore increasingly important for identifying viral evolution and understanding transmission networks. African countries require stronger sequencing capacity and mechanisms for sharing genomic and epidemiological information. Such capabilities can provide early warning of changes in viral circulation and support evidence-based public health interventions (Mohapatra et al., 2024).

Cross-Border Transmission and Regional Coordination

The movement of people across national borders creates additional opportunities for mpox transmission. Countries sharing porous borders may face difficulties coordinating case notification, contact tracing, screening, and outbreak response. A fragmented national response may consequently undermine containment efforts when cases move between jurisdictions.

Regional cooperation should include standardized surveillance definitions, interoperable reporting mechanisms, coordinated risk communication, cross-border contact tracing, and information sharing between public health institutions. Nachega et al. (2024) argue for stronger African and international action in response to the increasing mpox burden, while the WHO framework emphasizes coordinated approaches to prevention, preparedness, and response (World Health Organization, 2024).

Community Engagement, Stigma, and Misinformation

Community perceptions can significantly influence the success of outbreak-control interventions. Stigma, misinformation, fear, and misconceptions about mpox may discourage affected individuals from seeking healthcare or disclosing contacts. Bhat et al. (2023) and Musuka et al. (2024) demonstrate the importance of understanding social and behavioral factors in the development and implementation of effective prevention strategies.

Risk communication should therefore be culturally appropriate, scientifically accurate, and adapted to local contexts. Health authorities should work with community leaders, healthcare workers, civil society organizations, and trusted communication channels to promote accurate information about symptoms, transmission, prevention, testing, and available care. Enitan et al. (2024) further emphasize the importance of applying lessons from COVID-19 to improve communication, preparedness, and future outbreak responses.

Health Workforce and System Preparedness

Healthcare workers represent a critical component of mpox preparedness, yet inadequate staffing, insufficient infection-prevention training, and competing public health priorities

can reduce response capacity. Healthcare facilities require appropriate triage procedures, personal protective equipment, isolation arrangements, diagnostic pathways, and clinical management protocols.

Preparedness should therefore extend beyond emergency outbreak responses toward routine strengthening of health systems. Training healthcare workers in recognition, diagnosis, infection prevention, reporting, and case management can improve the speed and quality of responses. Mohamed Abdoul-Latif et al. (2024) argue for comprehensive preparedness strategies that address epidemiological, clinical, social, and health-system dimensions of mpox.

Strategic Preparedness Priorities

A resilient African mpox response should combine surveillance, diagnostics, vaccination, clinical management, community engagement, genomic monitoring, and regional coordination. The One Health approach is particularly relevant because mpox involves interactions between humans, animals, and environmental factors. Strengthening collaboration between public health, veterinary, environmental, and research institutions can improve understanding of zoonotic transmission and support earlier identification of emerging threats (Musuka et al., 2024; World Health Organization, 2024).

Overall, the persistence of mpox in Africa demonstrates that outbreak management cannot rely solely on emergency interventions after cases have been detected. Sustainable preparedness requires investment in surveillance, laboratory systems, healthcare workforce capacity, equitable access to vaccines and therapeutics, genomic monitoring, community engagement, and regional coordination. Integrating these measures within a One Health framework can improve early detection and containment while strengthening broader health-system resilience (World Health Organization, 2024; Nachega et al., 2024; Mohamed Abdoul-Latif et al., 2024).

DISCUSSION

The epidemiological evidence demonstrates that mpox remains an important public health concern in Africa, particularly because of persistent transmission, changing disease patterns, and the emergence of new viral variants. The resurgence of cases highlights the need to move beyond reactive outbreak responses toward sustained surveillance, preparedness, and prevention systems. Nachega et al. (2024) emphasize that the increasing burden of mpox in Africa requires urgent strengthening of national and regional public health capacities, particularly in countries where surveillance and response infrastructure remains limited.

A major concern is the diversity of transmission pathways and risk factors associated with mpox. Musuka et al. (2024) identify socioeconomic conditions, close human contact, limited healthcare access, and gaps in public health awareness as important factors influencing transmission. The multi-country nature of recent outbreaks further demonstrates the importance of cross-border surveillance and coordinated regional responses (Bhat et al., 2023). These findings support

the World Health Organization's (2024) emphasis on integrated surveillance, community protection, vaccination, and coordinated outbreak response.

Clinical recognition and laboratory confirmation are also critical components of effective management. Mpox can present with variable clinical manifestations, creating diagnostic challenges, particularly where laboratory capacity is constrained. Titanji et al. (2024) highlight the importance of appropriate clinical assessment, molecular diagnosis, and timely treatment to reduce complications and improve patient outcomes. Similarly, Kumar et al. (2024) emphasize advances in diagnostic and therapeutic approaches while noting the continuing need for improved accessibility and implementation in resource-constrained settings.

The emergence of new variants adds another layer of complexity to mpox control. Verma et al. (2024) describe the challenges associated with emerging variants and the potential implications for transmission, disease severity, and preparedness. Mohapatra et al. (2024) further demonstrate that understanding transmission dynamics and complications is essential for designing effective mitigation strategies. Consequently, genomic surveillance should be incorporated into broader epidemiological systems to support early identification of important viral changes.

Prevention requires a comprehensive approach rather than reliance on a single intervention. Vaccination, infection prevention and control, risk communication, case identification, contact tracing, and community engagement should operate as interconnected components of outbreak management. The WHO (2024) strategic framework supports an integrated approach that prioritizes prevention, surveillance, research, clinical care, and community protection. Mohamed Abdoul-Latif et al. (2024) similarly emphasize the need for multifaceted preparedness capable of addressing the biological, social, and health-system dimensions of mpox resurgence.

The experience of COVID-19 also provides important lessons for strengthening mpox preparedness. Enitan et al. (2024) argue that weaknesses exposed during previous pandemics including delayed detection, inadequate resources, misinformation, and fragmented coordination should inform future infectious-disease preparedness. For Africa, strengthening laboratory networks, healthcare workforce capacity, vaccine access, data-sharing mechanisms, and community-based surveillance would improve the ability to detect and contain outbreaks before they expand.

Overall, effective mpox management in Africa requires sustained investment in public health infrastructure and stronger collaboration between governments, health institutions, communities, and international organizations. Combining epidemiological surveillance with accessible diagnostics, appropriate clinical management, vaccination, One Health approaches, and regional cooperation can reduce transmission and improve preparedness for future outbreaks (Nachega et al., 2024; Musuka et al., 2024; World Health Organization, 2024).

CONCLUSION

It is crucial for public health that mpox continues to be a threat in Africa, due to ongoing transmission, evolving epidemiological trends, new variants of the disease, and the lack of surveillance and healthcare capacities. To manage effectively, a coordinated approach should be implemented involving early case detection, effective laboratory diagnosis, clinical management, infection prevention and control, vaccines and community based risk communication. Capacity building for diagnosis and clinical management is especially crucial as timely diagnosis and management can limit complications and transmission (Titanji et al., 2024; Kumar et al., 2024).

The persistent occurrence of outbreaks underscores the importance of more robust surveillance systems, better cross-border information and collaboration, and ongoing investments in public health systems. Additionally, countries in Africa must enhance their readiness for new variants and incorporate past lessons gained in mpox preparedness planning, such as from previous outbreaks, including COVID-19 (Nachega et al., 2024; Verma et al., 2024; Enitan et al., 2024). The lessons learnt from past outbreaks in Africa also suggest that prevention measures need to tackle multiple behavioral, socioeconomic, environmental and health risk factors rather than limited interventions (Musuka et al., 2024; Bhat et al., 2023).

Finally, the WHO strategic framework offers an important underpinning to coordinated prevention and control, and a One Health approach can facilitate more effective prevention and control of human, animal and environmental transmission risks (World Health Organization, 2024; Mohamed Abdoul-Latif et al., 2024). Sustained surveillance, equitable access to vaccines and therapeutics, regional cooperation, and research on transmission and mitigation strategies will thus be critical to minimize the impact of mpox and enhance Africa's preparedness for future outbreaks (Mohapatra et al., 2024).

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