

Dr. Amit Sachdeva¹, Mr. Nasim Ahmed^{2*}

Assistant Professor, Department of Community Medicine, Indira Gandhi Medical College, Shimla, Himachal Pradesh, India. Email: dramitsachdeva2410@gmail.com

² Research Scholar

Received: Jan. 03, 2025; Revised: Jan. 09, 2025; Accepted: Jan. 16, 2025 ; Published: Jan. 28, 2025

Under a Creative Commons license Doi: 10.47310/ml.2025.v02i01.047

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

Abstract: The recent global spread of monkeypox has underscored the critical need for robust public health strategies to combat zoonotic diseases. Historically confined to Central and West Africa, monkeypox has emerged as a significant threat to non-endemic regions, including India. This review examines India's comprehensive preparedness for monkeypox, highlighting the country's proactive measures in surveillance, healthcare infrastructure, public awareness, and international collaboration. The 2022 outbreak, marked by the West African clade, prompted heightened surveillance and targeted public health interventions, particularly among high-risk groups. In contrast, the 2024 outbreak, involving a more virulent strain, emphasized the importance of sustained vigilance and adaptive strategies. India's response, focusing on early detection, equitable vaccine distribution, and strengthening healthcare infrastructure, has been critical in preventing widespread transmission. Moving forward, India's success will depend on continued investments in healthcare, effective public communication, and collaboration with global health organizations. By leveraging its role as a global leader in vaccine production and public health innovation, India is well-positioned to contribute to international efforts in combating zoonotic diseases and future health threats.

Keywords: Monkeypox, India, zoonotic diseases, public health, surveillance, vaccine distribution, healthcare infrastructure, international collaboration, 2022 outbreak, 2024 outbreak, global health security.

INTRODUCTION

The global emergence of monkeypox has highlighted the inherent vulnerability of nations to zoonotic diseases, which are infections that are transmitted from animals to humans. Monkeypox, a viral disease historically confined to the tropical rainforests of Central and West Africa, has made its way to non-endemic regions in recent years, causing concern on a global scale. The spread of this virus outside its traditional boundaries underscores the unpredictable nature of zoonotic pathogens and the critical need for robust global health security measures.[1-3]

India, with its vast population and diverse healthcare challenges, represents a unique case in managing the threat of monkeypox. The country's large and interconnected population, combined with varying levels of healthcare infrastructure across different regions, presents both opportunities and challenges in disease surveillance, prevention, and response. Recognizing the potential threat posed by monkeypox, India has been proactive in its approach, implementing measures aimed at early detection, containment, and mitigation of the virus's impact.[4-6]

This review seeks to provide a comprehensive analysis of India's preparedness for monkeypox, examining recent developments, public health strategies, challenges, and the steps taken by the Indian government and health authorities to address this emerging public health threat.

The Global Context and India's Initial Response [7-11]

Monkeypox, caused by the monkeypox virus, is a zoonotic disease that presents with symptoms that closely resemble those of smallpox, albeit generally milder. Despite its lower lethality compared to smallpox, monkeypox can still result in severe outcomes, particularly among vulnerable populations such

How to cite this content: Amit Sachdeva; "India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats" Medletter. V2 I1 (2025) pp 280-292

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

as children, the elderly, and those with weakened immune systems. The case fatality rate of monkeypox ranges between 3% and 6%, making it a significant public health concern, especially in regions with limited access to healthcare.

The virus primarily spreads through direct contact with infected individuals or animals, or through exposure to contaminated materials. This includes contact with bodily fluids, respiratory droplets, or lesions on the skin. The disease's ability to transmit through multiple routes, including potentially through sexual contact, complicates containment efforts, particularly in densely populated areas.

India's encounter with monkeypox began in July 2022 when the first case was reported in Kerala. The individual had recently returned from abroad, underscoring the role of international travel in the spread of zoonotic diseases. This initial case was quickly followed by others, mostly involving individuals with a history of travel to affected regions. By mid-2022, India had reported 10 confirmed cases, and the government swiftly implemented a range of public health measures to prevent the virus from spreading further within the country.

The rapid response by Indian health authorities included increased surveillance at points of entry, isolation of confirmed cases, and widespread public health messaging to educate the population about the disease. The interconnected nature of global health meant that India's response had to be aligned with international best practices, emphasizing the need for coordination between domestic and international health agencies.

Transmission and Epidemiology: Understanding the Virus [12-14]

Monkeypox transmission occurs primarily through direct contact with an infected person's bodily fluids, respiratory droplets, or lesions. However, the virus is also capable of spreading via contaminated materials such as clothing, bedding, or surfaces that have been in contact with an infected individual. This multifaceted transmission route complicates efforts to contain the virus, especially in environments where close contact and shared materials are common, such as households, healthcare settings, and crowded public spaces.

One of the more concerning aspects of the current monkeypox outbreaks is the potential for transmission through sexual contact. While traditionally not considered a sexually transmitted infection, evidence has emerged suggesting that monkeypox can spread through intimate contact, particularly among men who have sex with men (MSM). This has added a layer of complexity to the epidemiological profile of the disease and necessitates targeted public health interventions to address this specific mode of transmission.

The incubation period for monkeypox ranges from 5 to 21 days, which presents challenges for public health officials trying to contain the spread. During this period, infected individuals may not show any symptoms, yet they could still pose a risk of transmitting the virus to others. The symptoms of monkeypox, which include fever, headache, muscle aches, swollen lymph nodes, and a distinctive rash that progresses to fluid-filled blisters, often lead to self-limiting cases. However, severe complications, such as secondary infections, bronchopneumonia, sepsis, and encephalitis, can occur, particularly in those with compromised immune systems.

Understanding the virus's transmission dynamics and clinical presentation is crucial for effective containment and management strategies. This knowledge informs the development of guidelines for infection control, isolation protocols, and the management of contacts who may have been exposed to the virus.

Challenges in Preparedness [12-18]

India's preparedness for monkeypox faces several critical challenges, which are addressed through various public health initiatives and policies. These challenges include the need for enhanced surveillance, effective public communication, bolstered healthcare infrastructure, equitable vaccine access, and coordinated efforts across federal and state agencies.

1. Surveillance and Detection

One of the primary challenges in controlling monkeypox in India is the need for robust surveillance and early detection systems. Surveillance at points of entry—such as airports, seaports, and land borders—is

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

essential to identify and isolate cases before they can spread within the community. The Indian government has responded by enhancing screening procedures for travelers arriving from high-risk regions, particularly from Central and West Africa, where monkeypox is endemic.

However, the long incubation period of the virus poses a significant challenge. Infected individuals may be asymptomatic during travel, allowing them to pass through screening procedures undetected. This underscores the importance of not only initial screening but also follow-up monitoring and community-based surveillance to detect symptoms that may develop after entry into the country. Strengthening the capacity of local health systems to identify and report cases in real-time is also vital for effective containment.

Additionally, integrating surveillance for monkeypox with broader disease surveillance systems can help ensure that cases are not missed, particularly in rural or resource-limited areas where healthcare infrastructure may be weaker. Investment in technology and training for healthcare workers at the front lines of surveillance is crucial for maintaining vigilance against monkeypox and other emerging infectious diseases.

2. Public Awareness and Communication

Public awareness and effective communication are cornerstones of any successful public health response, particularly in a diverse and populous country like India. Educating the public on the modes of transmission, symptoms, and preventive measures for monkeypox is essential to curbing the spread of the virus and minimizing public panic. However, India faces significant challenges in reaching all segments of the population, given the country's linguistic, cultural, and socioeconomic diversity.

Misinformation and stigma present additional barriers to effective public health communication. In particular, the association of monkeypox with certain demographic groups, such as MSM, has led to stigmatization and reluctance to seek medical care. Combatting misinformation requires a multifaceted approach, including the use of credible sources, engagement with community leaders, and leveraging various media platforms to disseminate accurate information.

Communication strategies must also be culturally sensitive and inclusive to ensure that they resonate with all segments of the population. This includes tailoring messages to local languages and contexts, using trusted community figures to convey important information, and ensuring that vulnerable populations, such as migrants and those in remote areas, have access to timely and accurate information.

3. Healthcare Infrastructure and Capacity

India's healthcare system is diverse, with significant variation in resources and capabilities across different regions. While some areas boast advanced medical facilities, others, particularly in rural and underserved regions, struggle with limited access to healthcare services. This disparity poses a significant challenge in managing emerging infectious diseases like monkeypox, which require specialized care and isolation facilities.

The need for isolation wards, personal protective equipment (PPE), and trained healthcare personnel is particularly pressing. Hospitals must be prepared not only to treat monkeypox patients but also to prevent the virus from spreading within healthcare facilities. This requires stringent infection control measures, adequate supplies of PPE, and ongoing training for healthcare workers in managing highly contagious diseases.

Expanding healthcare capacity to handle a potential surge in cases is another critical concern. This includes increasing the number of isolation beds, ensuring the availability of medical supplies, and enhancing laboratory capacity for diagnostic testing. Strengthening healthcare infrastructure in rural and remote areas is particularly important, as these regions may be disproportionately affected by outbreaks and have less capacity to respond.

4. Vaccine Deployment and Access

Vaccination is a key component of the strategy to prevent and control monkeypox. The use of smallpox vaccines, which offer cross-protection against monkeypox, is being considered as a preventive measure. However, ensuring the availability and equitable distribution of vaccines presents a significant challenge.

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

India must navigate complex issues related to vaccine procurement, storage, and deployment, particularly in rural and underserved areas. The logistics of distributing vaccines across a country as large and diverse as India require careful planning and coordination. This includes ensuring that cold chain systems are in place to maintain vaccine efficacy, that healthcare workers are trained to administer the vaccine, and that priority groups, such as healthcare workers and high-risk populations, are identified and prioritized.

Equitable access to vaccines is also a critical consideration. Efforts must be made to ensure that vaccines are distributed fairly across different regions and that vulnerable populations, such as those in remote or economically disadvantaged areas, are not left behind. This requires a coordinated approach that involves both central and state governments, as well as partnerships with international organizations and the private sector.

5. Coordination Across States and Central Agencies

India's federal structure presents both opportunities and challenges in managing public health responses. While the central government plays a key role in setting national policies and guidelines, the implementation of these measures often falls to state governments. Ensuring seamless coordination between central and state agencies is crucial for effective preparedness and response to monkeypox.

Uniform implementation of guidelines and protocols across states is essential to prevent gaps in the healthcare system that could allow the virus to spread. This requires strong communication channels between central and state health authorities, as well as mechanisms for monitoring and evaluating the effectiveness of interventions at the state level.

Additionally, the diverse healthcare landscape across Indian states necessitates tailored approaches that take into account regional differences. States with more developed healthcare systems may require different strategies compared to those with limited resources. Flexibility in policy implementation, along with the provision of targeted support to states that need it, will be critical to ensuring a coordinated and effective response to monkeypox across the country.

Government and Public Health Response [14-21]

In response to the growing threat of monkeypox, the Indian government has implemented a comprehensive, multi-faceted approach that integrates surveillance, healthcare preparedness, public awareness campaigns, and international collaboration. These efforts are designed to prevent the spread of the virus, manage cases effectively, and minimize the impact on public health. Below is a detailed elaboration of the key components of India's government and public health response to monkeypox.

1. Guidelines and Protocols

The Ministry of Health and Family Welfare (MoHFW) has played a central role in formulating and disseminating guidelines to manage the monkeypox threat. These guidelines cover a wide range of areas, including surveillance, case management, infection prevention, and control measures.

- **Surveillance:** The guidelines emphasize the importance of strengthening surveillance systems to ensure the early detection of cases. This includes detailed instructions for healthcare workers on identifying symptoms, reporting cases, and implementing appropriate measures to contain the virus.
- **Case Management:** Protocols for managing confirmed cases of monkeypox are also outlined in the guidelines. These include isolation procedures, clinical management strategies, and guidelines for the use of personal protective equipment (PPE) by healthcare workers.
- **Infection Control:** The guidelines stress the need for strict adherence to infection control measures within healthcare settings to prevent nosocomial transmission (i.e., transmission within hospitals). This includes disinfection protocols, safe handling of contaminated materials, and waste management procedures.

The guidelines are regularly updated in response to the evolving situation, ensuring that healthcare providers across the country have access to the latest information and best practices. This dynamic approach allows India to adapt its strategies as new data becomes available, aligning with global recommendations and enhancing the country's capacity to manage the disease effectively.

2. Enhanced Surveillance at Points of Entry

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

Recognizing the critical role of entry points in preventing the importation of monkeypox, the Indian government has enhanced surveillance at airports, seaports, and land borders. These measures are crucial given the role international travel has played in the spread of the virus to non-endemic regions.

- **Thermal Screening:** Travelers entering the country are subjected to thermal screening to detect those with fever, a common early symptom of monkeypox. This immediate screening helps identify potentially infected individuals before they can move freely within the country.
- **Health Monitoring:** In addition to thermal screening, health monitoring facilities have been established at key entry points. These facilities are equipped to assess travelers who exhibit symptoms or who have a travel history to regions with reported cases of monkeypox.
- **High Alert Status:** Health units at these entry points have been placed on high alert, with staff trained to recognize the clinical presentation of monkeypox. This training includes identifying rashes, lesions, and other symptoms that may not be detected through thermal screening alone.

This proactive surveillance strategy aims to catch potential cases early, reducing the risk of the virus gaining a foothold in the community and spreading more widely.

3. Hospital Preparedness and Designated Centers

India has identified key hospitals to serve as nodal centers for the treatment and management of monkeypox cases. These hospitals are strategically located in major cities, including New Delhi, to ensure that they can serve as central hubs for both treatment and coordination of the response.

- **Designated Centers:** Hospitals such as Ram Manohar Lohia Hospital, Safdarjung Hospital, and Lady Hardinge Medical College in New Delhi have been designated as the primary centers for managing monkeypox cases. These hospitals are equipped with specialized isolation wards designed to prevent the spread of the virus within healthcare settings.
- **Isolation Facilities:** Isolation facilities are a critical component of hospital preparedness. These facilities are designed to accommodate patients with monkeypox while minimizing the risk of transmission to healthcare workers and other patients. The design includes negative pressure rooms and strict protocols for the movement of healthcare personnel and patients within the hospital.
- **Training for Healthcare Workers:** Staff at these designated centers have received specialized training in handling infectious diseases, including the use of PPE and the implementation of infection control measures. This training ensures that healthcare workers are equipped to manage cases safely and effectively, reducing the risk of infection.

State governments have also been instructed to prepare hospitals within their jurisdictions, ensuring a decentralized approach to healthcare preparedness. This enables regions across the country to respond swiftly to any cases that may arise, reducing the burden on central hospitals and ensuring that care is available closer to where patients are located.

4. Testing and Diagnosis

Accurate and timely diagnosis is critical for controlling monkeypox outbreaks. To this end, the Ministry of Health has established a network of 32 laboratories across India that are capable of testing for monkeypox. This network forms the backbone of India's diagnostic response, ensuring that suspected cases can be confirmed quickly and reliably.

- **Laboratory Network:** The laboratories in this network are equipped with the necessary reagents and technologies to perform diagnostic tests for monkeypox. This includes polymerase chain reaction (PCR) testing, which is considered the gold standard for diagnosing viral infections.
- **Rapid Results:** The goal of the laboratory network is to provide rapid results, facilitating timely diagnosis and intervention. Early diagnosis allows for the swift isolation of confirmed cases, reducing the likelihood of further transmission.
- **Geographical Distribution:** The laboratories are strategically distributed across the country, ensuring that testing is accessible even in remote areas. This geographic spread is particularly important in a country as large and diverse as India, where centralized testing alone would not be sufficient to meet the needs of all regions.

By strengthening India's diagnostic capabilities, this network of laboratories plays a crucial role in the broader public health response to monkeypox.

5. Public Awareness Campaigns

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

Public awareness is a cornerstone of India's response to monkeypox. Educating both healthcare providers and the general public about the disease is essential for early detection, prevention, and reducing stigma.

- **Targeted Campaigns:** The government has launched campaigns aimed at raising awareness of monkeypox symptoms, transmission modes, and preventive measures. These campaigns are disseminated through multiple channels, including television, radio, social media, and print media, to reach a wide audience.
- **Healthcare Provider Education:** Specific efforts are made to educate healthcare providers about the clinical management of monkeypox, ensuring that they are equipped to diagnose and treat the disease effectively. This includes training sessions, distribution of clinical guidelines, and access to resources that detail the latest developments in the management of monkeypox.
- **Combatting Misinformation:** A significant focus of the public awareness campaigns is on combatting misinformation and reducing the stigma associated with monkeypox. The government has recognized that misinformation can lead to fear and discrimination, particularly against marginalized communities. Campaigns are designed to provide accurate information and reassure the public that monkeypox, while serious, can be managed effectively with proper care and precautions.

These public awareness efforts are critical in ensuring that the public remains informed and engaged in the fight against monkeypox, while also fostering a sense of community responsibility in preventing the spread of the virus.

6. Vaccination Strategies

Vaccination is a key preventive measure in controlling monkeypox, and the Indian government is actively exploring the use of smallpox vaccines due to their known cross-protection against monkeypox.

- **NTAGI Recommendations:** The National Technical Advisory Group on Immunization (NTAGI) is assessing the best strategies for deploying vaccines, including identifying target groups who should be prioritized for vaccination. This includes healthcare workers, high-risk populations, and individuals who have been exposed to confirmed cases.
- **Vaccine Availability:** Ensuring that vaccines are available in sufficient quantities is a significant focus of the government's strategy. This involves coordinating with vaccine manufacturers, securing supplies, and managing the logistics of vaccine distribution across the country.
- **Equitable Distribution:** A key challenge in the vaccination strategy is ensuring that vaccines are distributed equitably across regions, particularly in rural and underserved areas. The government is working to establish distribution networks that can reach even the most remote communities, ensuring that no one is left behind.

The success of the vaccination strategy will depend on careful planning, coordination, and public cooperation. By prioritizing vaccination efforts, the government aims to provide an additional layer of protection against the spread of monkeypox.

7. International Collaboration

India's response to monkeypox is not conducted in isolation. The country continues to collaborate closely with international health organizations, particularly the World Health Organization (WHO).

- **WHO Guidelines:** India's public health strategies are aligned with WHO guidelines, ensuring that the country's response is based on the latest global recommendations. This includes adhering to protocols for surveillance, case management, and vaccination.
- **Information Sharing:** Collaboration with international health bodies also involves sharing information and data on monkeypox cases, which helps track the spread of the virus globally. This exchange of information is vital for understanding the epidemiology of the disease and for coordinating international efforts to combat it.
- **Public Health Emergency of International Concern (PHEIC):** The WHO's declaration of monkeypox as a Public Health Emergency of International Concern (PHEIC) has underscored the need for global vigilance and cooperation. India's participation in international discussions and its adherence to PHEIC recommendations highlight its commitment to contributing to global efforts to control monkeypox.

Through international collaboration, India ensures that its response to monkeypox is informed by global best practices and that it remains an active participant in the worldwide effort to combat the virus.

Recent Developments in Research and Healthcare Initiatives [18-25]

In addition to immediate response measures, India is investing in research and development to enhance its long-term preparedness for monkeypox. These initiatives are focused on vaccine and therapeutic

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

research, strengthening healthcare infrastructure, and implementing effective contact tracing and quarantine protocols.

1. Vaccine and Therapeutic Research

Recognizing the importance of developing targeted treatments and vaccines for monkeypox, India is actively involved in research efforts that could provide more effective tools for managing the disease.

- **Monoclonal Antibodies and Antiviral Drugs:** Research is underway to explore the use of monoclonal antibodies and antiviral drugs, such as tecovirimat, which have shown promise in the treatment of monkeypox. These therapeutic options could provide critical support in managing severe cases and preventing complications.
- **Vaccine Development:** In addition to exploring the use of existing smallpox vaccines, research efforts are focused on developing new vaccines specifically designed to protect against monkeypox. These efforts are part of a broader initiative to ensure that India has access to the most effective preventive measures in the long term.

By investing in vaccine and therapeutic research, India aims to strengthen its arsenal against monkeypox, ensuring that it is better prepared for future outbreaks.

2. Strengthening Healthcare Infrastructure

Long-term preparedness for monkeypox and other emerging infectious diseases requires a robust healthcare infrastructure that can respond effectively to outbreaks.

- **Pradhan Mantri Ayushman Bharat Health Infrastructure Mission:** This flagship program aims to strengthen public health laboratories, enhance healthcare capacity, and train healthcare personnel to handle emerging infectious diseases. The program is particularly focused on building infrastructure in rural and underserved areas, which are often most vulnerable during outbreaks.
- **Capacity Building:** Strengthening healthcare infrastructure involves expanding the number of isolation wards, increasing the availability of medical supplies, and improving the capacity of laboratories to conduct diagnostic testing. Training healthcare personnel in infection prevention and control is also a key component of this initiative.

These efforts ensure that India's healthcare system is resilient and capable of responding to future outbreaks, reducing the impact of diseases like monkeypox on public health.

3. Contact Tracing and Quarantine Protocols

Effective contact tracing and quarantine protocols are essential for controlling the spread of monkeypox, particularly in the context of travelers arriving from high-risk countries.

- **Contact Tracing:** Once a suspected case of monkeypox is identified, contact tracing is initiated to identify all individuals who may have been exposed to the virus. This process involves interviewing the patient, identifying close contacts, and notifying them of their potential exposure.
- **Monitoring and Quarantine:** Contacts are monitored for symptoms for 21 days, which corresponds to the maximum incubation period of the virus. Health workers who have been exposed to the virus are also monitored to ensure that any cases are identified and isolated promptly. Quarantine measures are implemented for individuals who exhibit symptoms or who have a high risk of developing the disease.
- **Coordination:** The success of contact tracing and quarantine protocols depends on effective coordination between public health authorities at the central and state levels. Timely action is crucial to preventing the virus from spreading further within the community.

By implementing strict contact tracing and quarantine protocols, India can quickly contain potential outbreaks and reduce the risk of widespread transmission.

Comparing the 2022 and 2024 Monkeypox Outbreaks [24-33]

The monkeypox outbreaks in 2022 and 2024 underscore the evolving nature of viral threats and the necessity for adaptable public health strategies. These outbreaks, while related, differ significantly in their epidemiology, geographical spread, and the response mechanisms they elicited from global and national health systems, particularly in India.

1. The 2022 Outbreak: First Significant Global Spread

The 2022 outbreak marked a pivotal moment in the global epidemiology of monkeypox, as it was the first time the virus spread significantly outside of its endemic regions in Central and West Africa.

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

- **Global Impact:** Over 50 countries were affected by the 2022 outbreak, a sharp contrast to the historical containment of monkeypox within African borders. This spread highlighted the increasing global interconnectedness and the potential for zoonotic diseases to cross borders swiftly through international travel.
- **India's Situation:** India reported 23 confirmed cases by the end of 2022. The cases were primarily linked to international travelers, reflecting the global nature of the outbreak. The West African clade of the virus, which has a lower mortality rate (ranging from 1% to 3%) compared to the Central African clade, was predominantly responsible for the infections. This clade, while less deadly, posed significant public health challenges due to its rapid spread.
- **Demographic Focus:** The 2022 outbreak also underscored the importance of targeted public health interventions, particularly among specific demographic groups such as men who have sex with men (MSM). The virus spread predominantly within social networks, making it imperative for public health campaigns to focus on high-risk communities without stigmatizing them.
- **India's Response:** In response to the 2022 outbreak, India implemented heightened surveillance at points of entry, launched public awareness campaigns, and strengthened international collaboration. The country focused on early detection and isolation of cases, using international guidelines to frame its response. The efforts were aimed at containing the spread and minimizing the impact on public health.

2. The 2024 Outbreak: A More Virulent Strain

By 2024, the monkeypox outbreak evolved, presenting new challenges for public health systems globally, including India.

- **Emergence of a More Virulent Strain:** The 2024 outbreak saw the emergence of Clade 1, a more virulent strain of the monkeypox virus. This strain was primarily identified in the Democratic Republic of Congo and other African countries, with a significantly higher mortality rate of approximately 3%, compared to the less virulent strain responsible for the 2022 outbreak.
- **Global and National Dynamics:** Despite the ongoing global transmission, India managed to avoid new cases after March 2024. This success can be attributed to the robust measures put in place following the 2022 outbreak, which were further strengthened in anticipation of the 2024 threat.
- **Government's Response:** The Indian government shifted its focus towards preparedness and readiness in 2024. This included enhancing healthcare infrastructure, maintaining strict surveillance at points of entry, and supporting research initiatives aimed at understanding and combating the more virulent strain. The WHO's re-declaration of monkeypox as a Public Health Emergency of International Concern (PHEIC) in August 2024 reinforced the importance of continued vigilance and international cooperation.
- **Lessons Learned:** The 2024 outbreak highlighted the need for sustained efforts in public health preparedness, as the virus's ability to evolve necessitated adaptive strategies. India's proactive measures, including bolstering healthcare infrastructure and ensuring ongoing surveillance, were key in preventing a resurgence of cases within the country.

Future Directions: Enhancing India's Preparedness [34-37]

As India continues to confront the challenges posed by monkeypox, several critical areas will be central to enhancing preparedness and ensuring a robust, long-term response. These areas focus on maintaining vigilance, improving healthcare systems, and fostering international collaboration to safeguard against future outbreaks.

1. Sustained Surveillance and Early Detection

Continuous surveillance at points of entry and within communities is essential to detect and respond promptly to any new cases of monkeypox.

- **Expanding Laboratory Networks:** India needs to expand its network of laboratories capable of diagnosing monkeypox, ensuring that testing is accessible across the country. This will help in the early detection of cases, particularly in rural and underserved areas.
- **Integrating Surveillance Systems:** Integrating monkeypox surveillance with other disease monitoring efforts can create a more comprehensive system that is capable of identifying emerging threats in real-time. This approach will ensure that India remains vigilant against not only monkeypox but other potential outbreaks.

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

- **Community-Based Monitoring:** Engaging local communities in surveillance efforts can enhance early detection. Training community health workers to recognize symptoms and report cases can help bridge the gap between centralized health systems and remote areas.

2. Public Health Communication and Community Engagement

Effective communication strategies are crucial for addressing the concerns of different communities and reducing the stigma associated with monkeypox.

- **Targeted Communication:** Public health messaging should be tailored to address the specific needs and concerns of different demographic groups. This includes culturally sensitive campaigns that resonate with various communities, particularly those most at risk.
- **Engaging Community Leaders:** Collaborating with community leaders, healthcare workers, and civil society organizations can amplify the reach of public health messages. These partnerships can help disseminate accurate information, counter misinformation, and encourage preventive behaviors.
- **Stigma Reduction:** Efforts to reduce stigma are essential for ensuring that individuals seek medical attention without fear of discrimination. This includes public campaigns that promote understanding and compassion, alongside education about the nature of the disease.

3. Strengthening Healthcare Infrastructure

Ongoing investments in healthcare infrastructure are critical to ensuring that all regions of India are equipped to handle potential outbreaks.

- **Rural and Underserved Areas:** Special attention must be given to expanding access to healthcare in rural and underserved areas. This includes building new healthcare facilities, upgrading existing ones, and ensuring that they are equipped with the necessary medical supplies and trained personnel.
- **Isolation Facilities:** Expanding access to isolation facilities is crucial for managing infectious diseases like monkeypox. These facilities must be available in both urban and rural settings to ensure that all patients receive appropriate care.
- **Training Healthcare Workers:** Continuous training programs for healthcare workers on infection prevention and control measures are vital. This training should be updated regularly to reflect the latest guidelines and best practices.

4. Vaccine and Therapeutic Access

Ensuring equitable access to vaccines and treatments for monkeypox will be a priority moving forward.

- **Securing Supplies:** India must work to secure adequate supplies of vaccines and treatments, both through domestic production and international partnerships. As a global leader in vaccine production, India is well-positioned to contribute to international efforts to combat monkeypox.
- **Addressing Logistical Challenges:** Vaccine distribution and storage present logistical challenges that must be addressed, particularly in rural areas. Ensuring that vaccines are distributed efficiently and stored properly will be critical to their effectiveness.
- **Prioritizing High-Risk Populations:** Vaccination and treatment efforts should prioritize high-risk populations, including healthcare workers and those with known exposure to the virus. Clear guidelines and protocols must be established to ensure that these groups receive the necessary protections.

5. International Collaboration and Research

Continued collaboration with international health organizations and participation in global research initiatives will be essential.

- **Sharing Data and Research:** India should continue to share data, research findings, and best practices with other countries. This collaboration will enhance global understanding of monkeypox and contribute to the development of more effective interventions.
- **Global Partnerships:** Building partnerships with international organizations, such as the WHO, will help India stay informed about global developments and ensure that its response aligns with the latest international guidelines.
- **Participating in Global Trials:** India's participation in global clinical trials for vaccines and treatments can accelerate the development of effective countermeasures. By contributing to and benefiting from international research, India can strengthen its preparedness for future outbreaks.

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

6. Adaptation of Policies Based on Evolving Evidence

As new evidence emerges regarding the transmission, epidemiology, and treatment of monkeypox, India must remain flexible in adapting its policies and strategies.

- **Ongoing Monitoring:** Continuous monitoring of the situation will be essential for identifying emerging trends and adjusting strategies accordingly. This includes regularly reviewing and updating guidelines based on the latest scientific evidence.
- **Swift Policy Response:** India must be prepared to respond swiftly to changing circumstances. This includes the ability to scale up interventions quickly in the event of a resurgence and to implement new measures as necessary.
- **Flexibility in Implementation:** Policies should be flexible enough to account for regional variations in healthcare capacity and disease prevalence. Tailored approaches that consider local contexts will be more effective in managing outbreaks across the diverse landscape of India.

Enhancing India's Strategic Response to Monkeypox: Insights from Government Advisory [38-41]

In light of the declaration of Mpox (Monkeypox) as a Public Health Emergency of International Concern (PHEIC) on August 14, 2024, a detailed advisory has been issued to Points of Entry (PoEs) in India. Mpox is a viral zoonotic disease primarily found in the tropical rainforests of Central and West Africa, but it can occasionally spread to other regions. The disease typically presents with symptoms such as rash, fever, and swollen lymph nodes, which can lead to various medical complications. Although Mpox is generally self-limiting, with symptoms lasting 2 to 4 weeks, severe cases can occur, with a case fatality rate ranging from 1-10%. Transmission of the virus can occur from animals to humans through bites, scratches, bush meat preparation, direct contact with body fluids, or indirect contact with contaminated materials like bedding. Human-to-human transmission occurs through close contact, including face-to-face interactions, skin-to-skin contact, and even contact with contaminated objects and surfaces. Additionally, Mpox can spread during pregnancy, childbirth, or through close contact between an infected parent and child.

As of August 18, 2024, Mpox cases have been reported globally, particularly in several African countries, with imported cases in Sweden and Pakistan. In India, a few cases were reported during the last outbreak, with the most recent case in Kerala in March 2024. Although there are no current cases in India, the risk of Mpox reemerging remains, especially due to international travel. Consequently, preparedness measures have been reviewed and strengthened.

The advisory outlines several public health actions to be implemented at PoEs. Health desks at airports, seaports, and land borders (such as Attari, Petrapole, and Agartala) are advised to maintain heightened surveillance for travelers presenting with fever, profound weakness, or unexplained rashes. This is especially critical for individuals who have traveled to affected regions in the last 21 days or had contact with suspected or confirmed Mpox cases. Suspected cases identified at PoEs should be immediately isolated in transit facilities, and information should be promptly shared with the State or District Surveillance Officer (IDSP). Strict infection control practices must be followed when handling such cases.

In cases where a suspect is identified, arrangements should be made to transfer them to designated isolation facilities at referral hospitals by the IDSP team. Laboratory samples from suspected cases will be sent to designated laboratories for testing. Additionally, PoEs are advised to prepare a list of contacts for any suspected cases and share this information with the IDSP team if the case is confirmed. A self-reporting format for suspect cases should also be utilized and shared with relevant officials. To enhance awareness, the WHO's FAQs on Mpox should be disseminated among all stakeholders at PoEs.

The advisory also provides a helpline number, NCDC Helpline (+91) 011-23909348, for any queries or assistance. Furthermore, immigration and PoE/Airline operators are urged to provide all necessary support to APHO/PHO/LPHO in managing this PHEIC and to report any sick passengers. These measures are critical in ensuring that India remains vigilant and prepared to handle the threat of Mpox, particularly at its points of entry, thus preventing the potential spread of the virus within the country.

CONCLUSION

India's preparedness for monkeypox reflects a comprehensive and multi-layered approach that balances immediate responses with long-term strategies. The government's efforts in surveillance, healthcare infrastructure, public awareness, and research underscore its commitment to preventing and controlling monkeypox outbreaks.

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

- **Challenges Remain:** Despite these efforts, challenges remain, particularly in ensuring equitable access to vaccines and treatments, maintaining public awareness without causing undue alarm, and bolstering healthcare infrastructure in underserved regions. Addressing these challenges will be critical to India's success in managing future outbreaks.
- **Sustained Vigilance:** Moving forward, sustained vigilance will be essential. India must continue to invest in its healthcare systems, strengthen international collaborations, and remain flexible in its response strategies. The lessons learned from the monkeypox outbreaks of 2022 and 2024 will inform future approaches, ensuring that India is better prepared to face not only monkeypox but also other emerging infectious diseases.
- **Global Contribution:** By strengthening its public health systems and fostering international cooperation, India can continue to protect its population and contribute to global efforts to combat zoonotic diseases. India's role as a global leader in vaccine production and public health innovation positions it to play a pivotal role in shaping the global response to future health threats.

REFERENCES

1. Shehryar et al; "Unraveling Monkeypox: An Emerging Threat in Global Health" 15.8 (2023) Pp43961, doi <https://doi.org/10.7759/cureus.43961>
2. Khamees et al; "Human Monkeypox Virus in the Shadow of the COVID-19 Pandemic" 16.8 (2023) Pp1149-1157, doi <https://doi.org/10.1016/j.jiph.2023.05.001>
3. Jeyaraman et al; "Monkeypox: An Emerging Global Public Health Emergency" 12.10 (2022) Pp1590, doi <https://doi.org/10.3390/life12101590>
4. World Health Organization (WHO) et al; "Mpox (Monkeypox)" 1.1 (2023) Pp1-2, Available from: <https://www.who.int/news-room/fact-sheets/detail/monkeypox>
5. Centers for Disease Control and Prevention (CDC) et al; "About Mpox" 1.1 (2023) Pp1-2, Available from: <https://www.cdc.gov/poxvirus/mpox/about/index.html>
6. Al Awaidey et al; "Monkeypox Outbreak: More Queries Posed as Cases Globally Soar" 1.1 (2022) Pp1-9, doi <https://doi.org/10.5350/SQUMJ2022.22.01>
7. Pandya et al; "Monkeypox: An Unfamiliar Virus-Clinical and Epidemiological Characteristics, Diagnosis, and Treatment with Special Emphasis on Oral Health" 12.11 (2022) Pp2749, doi <https://doi.org/10.3390/diagnostics12112749>
8. Banuet-Martinez et al; "Monkeypox: A Review of Epidemiological Modelling Studies and How Modelling Has Led to Mechanistic Insight" 151.1 (2023) Pp121, doi <https://doi.org/10.1017/S0950268823000805>
9. Hirani et al; "A Review of the Past, Present, and Future of the Monkeypox Virus: Challenges, Opportunities, and Lessons from COVID-19 for Global Health Security" 11.11 (2023) Pp2713, doi <https://doi.org/10.3390/microorganisms11112713>
10. Sheek-Hussein et al; "Monkeypox: A Current Emergency Global Health Threat" 23.1 (2023) Pp5-16, doi <https://doi.org/10.5152/TurkJEmergMed.2023.22237>
11. Boora et al; "Monkeypox Virus Is Nature's Wake-Up Call: A Bird's-Eye View" 34.3 (2023) Pp191-203, doi <https://doi.org/10.1007/s13337-023-00839-0>
12. Harapan et al; "Monkeypox: A Comprehensive Review" 14.10 (2022) Pp2155, doi <https://doi.org/10.3390/v14102155>
13. Centers for Disease Control and Prevention (CDC) et al; "Mpox: How It Spreads" 1.1 (2023) Pp1-2, Available from: <https://www.cdc.gov/poxvirus/mpox/if-sick/transmission.html>
14. Cleveland Clinic et al; "Monkeypox: Symptoms, Causes, Treatment, and Prevention" 1.1 (2023) Pp1-2, Available from: <https://my.clevelandclinic.org/health/diseases/22371-monkeypox>
15. Nyame et al; "Challenges in the Treatment and Prevention of Monkeypox Infection; A Comprehensive Review" 245.1 (2023) Pp106960, doi <https://doi.org/10.1016/j.actatropica.2023.106960>
16. Watarkar et al; "Vaccines for Monkeypox Disease and Challenges in Its Production and Distribution: A Lesson from COVID-19 Pandemic" 109.3 (2023) Pp536-538, doi <https://doi.org/10.1097/JS9.000000000000138>
17. Times of India et al; "Monkeypox Preparedness in India: 13 Big Questions Answered Here" 1.1 (2023) Pp1-2, Available from: <https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/monkeypox-preparedness-in-india-13-big-questions-answered-here/articleshow/112646959.cms>

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

18. World Health Organization (WHO) et al; "Monkeypox: Priority Actions and Technical Brief" 1.1 (2022) Pp1-2, Available from: https://cdn.who.int/media/docs/default-source/searo/who/monkeypox/searo-mp-techbrief-priority-actions-300522.pdf?sfvrsn=ae7be762_1
19. Dubey et al; "Enhancing Nursing Care in Monkeypox (Mpox) Patients: Differential Diagnoses, Prevention Measures, and Therapeutic Interventions" 15.9 (2023) Pp44687, doi <https://doi.org/10.7759/cureus.44687>
20. Kumar et al; "Recent Outbreak of Monkeypox: Implications for Public Health Recommendations and Crisis Management in India" 15.9 (2023) Pp45671, doi <https://doi.org/10.7759/cureus.45671>
21. Manju et al; "Monkeypox Viruses: Resurgence of Global Threat to Mankind" 16.suppl 1 (2022) Pp2989-2999, doi <https://doi.org/10.22207/IPAM.16.SPL1.07>
22. Maqbool et al; "Role of Vaccination in Patients with Human Monkeypox Virus and Its Cardiovascular Manifestations" 86.3 (2024) Pp1506-1516, doi <https://doi.org/10.1097/MS9.0000000000001710>
23. Chandran et al; "Major Advances in Monkeypox Vaccine Research and Development – An Update" 16.suppl 1 (2022) Pp3083-3095, doi <https://doi.org/10.22207/IPAM.16.SPL1.15>
24. Lu et al; "Mpox (Formerly Monkeypox): Pathogenesis, Prevention, and Treatment" 8.1 (2023) Pp458, doi <https://doi.org/10.1038/s41392-023-01743-5>
25. World Health Organization (WHO) et al; "Monkeypox - Disease Outbreak News" 1.1 (2022) Pp1-2, Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON390>
26. Qudus et al; "The Prospective Outcome of the Monkeypox Outbreak in 2022 and Characterization of Monkeypox Disease Immunobiology" 13.1 (2023) Pp1196699, doi <https://doi.org/10.3389/fcimb.2023.1196699>
27. Duarte et al; "Unveiling the Global Surge of Mpox (Monkeypox): A Comprehensive Review of Current Evidence" 4.1 (2024) Pp100141, doi <https://doi.org/10.1016/j.microb.2024.100141>
28. World Health Organization (WHO) et al; "Monkeypox Outbreak 2022" 1.1 (2022) Pp1-2, Available from: <https://www.who.int/emergencies/situations/monkeypox-oubrak-2022>
29. Alakunle et al; "A Comprehensive Review of Monkeypox Virus and Mpox Characteristics" 14.1 (2024) Pp1360586, doi <https://doi.org/10.3389/fcimb.2024.1360586>
30. World Health Organization (WHO) et al; "Monkeypox - Disease Outbreak News, 25 July 2022" 1.1 (2022) Pp1-2, Available from: <https://www.who.int/emergencies/disease-outbreak-news/item/2022-DON396>
31. Agarwal et al; "Comparative Genome Analysis Reveals Driving Forces Behind Monkeypox Virus Evolution and Sheds Light on the Role of ATC Trinucleotide Motif" 10.1 (2024) Ppveae043, doi <https://doi.org/10.1093/ve/veae043>
32. Capobianchi et al; "Monkeypox 2022 Outbreak in Non-Endemic Countries: Open Questions Relevant for Public Health, Nonpharmacological Intervention and Literature Review" 12.1 (2022) Pp1005955, doi <https://doi.org/10.3389/fcimb.2022.1005955>
33. Kraemer et al; "Tracking the 2022 Monkeypox Outbreak with Epidemiological Data in Real-Time" 22.7 (2022) Pp941-942, doi [https://doi.org/10.1016/S1473-3099\(22\)00359-0](https://doi.org/10.1016/S1473-3099(22)00359-0)
34. Times of India et al; "Mpox Outbreak: Indian Airports, Borders on High Alert, Officials to Increase Surveillance" 1.1 (2023) Pp1-2, Available from: <https://timesofindia.indiatimes.com/travel/travel-news/mpox-outbreak-indian-airports-borders-on-high-alert-officials-to-increase-surveillance/articleshow/112643271.cms>
35. The Hindu et al; "Union Health Minister Nadda Reviews India's Preparedness for Monkeypox" 1.1 (2023) Pp1-2, Available from: <https://www.thehindu.com/news/national/union-health-minister-nadda-reviews-indias-preparedness-for-monkeypox/article68536343.ece>
36. CNBC TV18 et al; "WHO Declares Mpox a Global Health Emergency, India Reviews Response and Preparedness Measures" 1.1 (2023) Pp1-2, Available from: <https://www.cnbctv18.com/india/healthcare/who-mpox-global-health-emergency-india-reviews-response-preparedness-measures-19461993.htm>
37. Times of India et al; "Monkeypox Preparedness in India: 13 Big Questions Answered Here" 1.1 (2023) Pp1-2, Available from: <https://timesofindia.indiatimes.com/life-style/health-fitness/health-news/monkeypox-preparedness-in-india-13-big-questions-answered-here/articleshow/112646959.cms>
38. Press Information Bureau (PIB) et al; "Monitoring the Mpox Situation in India" 1.1 (2023) Pp1-2, Available from: <https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2046443>

India's Strategic Response to Monkeypox: Strengthening Public Health Infrastructure, Surveillance, and Global Collaboration for Future Zoonotic Threats

39. World Health Organization (WHO) et al; "WHO Director-General Declares Mpox Outbreak a Public Health Emergency of International Concern" 1.1 (2024) Pp1-2, Available from: <https://www.who.int/news/item/14-08-2024-who-director-general-declares-mpox-outbreak-a-public-health-emergency-of-international-concern>
40. Press Information Bureau (PIB) et al; "Monkeypox Situation and Preparedness in India" 1.1 (2023) Pp1-2, Available from: <https://pib.gov.in/PressReleaseDetail.aspx?PRID=2046294>
41. Government of India et al; "Advisory for Points of Entry in View of Mpox (Monkeypox) Declared as PHEIC" 1.1 (2024) Pp1-2, Available from: [file:///C:/Users/DELL/Downloads/approved%20Advisory%20on%20Mpox%2020.08.24%20\(1\).pdf](file:///C:/Users/DELL/Downloads/approved%20Advisory%20on%20Mpox%2020.08.24%20(1).pdf)