WEEKLY SCIENTIFIC REVIEW
ON MPOX OUTBREAK

EDITION 29 OCTOBER 2024
No. 37

The content of this document are subject to change as the health situation evolves. All informations comes from a valid and credible source.

Editors : Emeline Simon, Nathan Claveau, Eric Rosenthal, Diana Molino, Mario Delgado-Ortega, Erica Telford, Meena Murmu, Sandrine Halfen, France Lert, Yoann Allier, Mathilde Certoux, Armelle Pasquet and Eric D'Ortenzio

ANRS Emerging Infectious Diseases - Paris, France
https://anrs.fr/en/emergence-units/cellule-emergence-mpox-drc-2023

INDEX

General informations

This section details the history and latest developments of the outbreak, with updates on its current status and risk assessment.

During summer 2022, an unprecedented mpox outbreak affecting multiple regions outside the African continent, with no previous history of sustained community transmission, has led to the WHO declaring a **Public Health Emergency of International Concern (PHEIC) on 23rd July 2022**. This outbreak, caused by **clade IIb MPXV strains from B.1 lineage**, resulted in nearly **109,699 cases** and **236 deaths** in more than 100 countries. The spread of this epidemic was mainly driven by local, in-country transmission via sexual contact among men who have sex with men (MSM), rather than at the animal-human interface as seen previously during zoonotic outbreaks observed in Africa. Timely and concerted public health responses from governments, international health organizations and affected communities - primarily MSM – yielded a significant decline of the disease burden throughout the following months, leading the WHO to end the mpox emergency status on 10th May 2023. While progress has been made in tackling the epidemic, human mpox cases and clusters are still being reported widely, notably in endemic countries, and concerted efforts must be pursued to ensure long-term management of the disease.

Since the beginning of 2023, the increasing frequency of outbreaks with **clade Ia MPXV** in African regions, particularly in the Democratic Republic of the Congo (DRC), has become a major concern. In 2023, health authorities in DRC have reported 14,626 suspected cases and 654 deaths, the **highest incidence ever recorded in the country**. This year, and as of 8 September 2024, there have been **35,925 suspected cases** and **1006 suspected deaths** (CFR: 3.1%), representing a **two-fold increase compared to the same period last year**. Additionally, case reports have been expanding into previously unaffected regions, with 25 of the 26 provincial health departments reporting active mpox circulation as the current epidemic unfolds, including three new provinces notifying cases this year. The provinces reporting the highest numbers of suspected cases are Equateur (North-West), Sud Unbangi (North-West), Sankuru (Central), Tshopo (North-Central) and South Kivu (East). **Children under the age of 15** are the most affected group, accounting for **66% of mpox reported cases** and **82% of fatalities**. Disease contraction and spreading are likely attributable to zoonotic transmission and interactions during playtime. In 2024, the number of reported cases has continued to rise in certain settings in Africa where the disease is endemic, such as the Central Africain Republic, the Republic of the Congo, Cameroon, Côte d'Ivoire, Liberia and Nigeria.

Between April and September 2023, the Ministry of Health of the DRC informed the WHO of outbreaks in previously unaffected provinces, linked to **sustained human-to-human transmission**, without suspected animal exposure. In April, a cluster of six confirmed mpox cases was reported in Kwango province among locals – five men and a woman – who had engaged in sexual relations with a Belgian resident presenting with genital and anal lesions. **This is the first formally documented sexual transmission of clade I MPXV viruses**. In August, four independent mpox clusters were recorded in Kinshasa, each originating from individuals who had been exposed in other provinces and subsequently traveled to the capital. In September, epidemiological reports from Kamituga identified a cluster of patients among adults, many of whom identified as sex workers, further supporting the shift towards sexual tranmission patterns. Since then, the local outbreak of Kamituga has been expanding geographically in the rest of South Kivu province (East) and recently to neighbouring North Kivu, with 373 confirmed mpox cases as of 2 June 2024. The majority of the cases are among **persons aged over 15 years**, who have reported both sexual and non-sexual direct contacts. No evidence of zoonotic transmission have been reported in the province since the start of the outbreak.

Phylogenetic analyses revealed **a novel variant of clade I MPXV (sublineage Ib)**, which is estimated to have emerged around mid-September 2023 in Kamituga, and have been responsible for the local outbreaks found in South and North Kivu via sustained human-to-human transmission. This variant exhibits **APOBEC-3 type mutations**, indicative of viral adaptation to human hosts. Although clade Ib MPXV currently accounts for a minority of reported mpox cases in the country, the rapid evolution of the outbreak in South and North Kivu, particularly among sex workers, raises significant concern about further expansion in the eastern mining provinces and other countries which share national borders or high cultural identities with DRC. The introduction of clade Ib MPXV into various and possibly intersecting sexual networks could facilitate and amplify the spread and the burden of this historically more virulent clade, although it remains unknown if this variant is more transmissible or causes more severe disease than other circulating strains. Furthermore, the potential for human-to-human transmission is enhanced in urban settings such as Kinshasa, the capital home of 17 million inhabitants, where the implementation of containment measures is more challenging.

Between 25th July and 22nd of August 2024, human mpox infections were reported for the first time in Rwanda, Burundi, Kenya and Uganda, all four neighbouring countries of the DRC. Several patients had recently traveled to the DRC or other regions with suspected MPXV circulation. Sequencing confirmed the clade 1b sublineage in cases detected in Rwanda, Kenya, and Uganda and Burundi. Several countries — Gabon, Guinea, Ghana, Zambia and Zimbabwe — recently reported its first mpox cases, lifting the number of affected African countries to 17. Burundi has the second-highest number of mpox cases after the DRC, with 987 positive cases out of 2508 detected as of 12 October 2024. In August and September 2024, travelers returning from high-risk regions have been detected with clade 1b mpox in some countries outside Africa, including Sweden, Thailand, and India, marking the first documented cases of clade 1 outside the African continent.

On 14th August 2024, in response to these alarming developments, **the WHO declared a second PHEIC related to mpox outbreak**, based on the recommendations of an IHR Emergency Committee. This decision came a day after the Africa CDC had designated the escalating outbreak in DRC and in a growing number of countries in Africa as **a Public Health Emergency of Continental Security (PHECS)** on August 13, 2024. The WHO is reviewing the risk assessment for mpox for the general population and is developing a new regional response plan to support surveillance, preparedness and response efforts. This plan will be implemented in collaboration with the governments of the affected countries, the Africa CDC, NGOs, and civil society. Additionnally, in collaboration with international partners and manufacturers, the WHO has activated the emergency process to accelerate vaccine access and donations for both MVA-BN and LC16, particularly for lower-income countries that have not yet issued their own national regulatory approval for the vaccines.

The Africa CDC assesses the risk of mpox in African countries as **high** due to the higher case fatality rate on the continent, despite the disease being moderately transmissible and usually self-limiting. In the EU/EEA, the risk from clade 1, including the novel variant 1b, is considered **very low**, as there is no evidence of its circulation outside Central Africa, and current vaccines and treatments are expected to remain effective. The risk of infection from mpox clade 2b, remains low for the general population and moderate among higher risk groups such as MSM or other individuals who have multiple sexual partners.

Sources :
i. Mpox (monkeypox) - Democratic Republic of the Congo | Disease Outbreak News. World Health Organization. 23 November 2023.
ii. Mpox - Democratic Republic of the Congo | Disease Outbreak News. World Health Organization. 14 June 2024.
iii. Mpox – African Region | Disease Outbreak News. World Health Organization. 22 August 2024.
iv. Africa CDC Epidemic Intelligence Weekly Report, 16 August 2024.
v. Multi-country outbreak of mpox, External situation report#34. World Health Organization. 28 June 2024.
vi. DR Congo grants emergency use for 2 mpox vaccines | News Brief. CIDRAP. 27 June 2024.
vii. WHO Director-General's opening remarks at the media briefing– 7 August 2024. World Health Organization.
viii. Risk to EU/EEA from variant mpox virus 'very low' | News. ECDC. 29 July 2024.

Timeline of events

This section presents a detailed chronology of the outbreak, with significant events related to public health strategies.

Zambia's Ministry of Health confirmed the country's first mpox case in a 32-year-old Tanzanian truck driver. The patient presented with a body rash, joint pain, sore throat, and general malaise. The report did not give information on the clade involved. Source : Africa CDC Epidemic Intelligence Weekly Report, 12 October 2024

First Mpox case in Mauritius

26 October 2024

Mauritius on October 26 announced its first mpox case, which involves a 49-year-old man who had traveled from Nigeria. The patient is being treated in isolation at a hospital in Port Louis.
Source: Cidrap

First Mpox Outbreak Reported in Zambia

10 October 2024

Zambia's Ministry of Health confirmed the country's first mpox case in a 32-year-old Tanzanian truck driver. The patient presented with a body rash, joint pain, sore throat, and general malaise. The report did not give information on the clade involved.
Source: Africa CDC Epidemic Intelligence Weekly Report, 12 October 2024

First case of Mpox clade Ib in India

23 September 2024

A 38-year-old Indian man living in Kerala has been diagnosed with clade Ib MPXV, after travelling from the United Arab Emirates. The patient is currently hospitalized for isolation purposes. No related infections were found in the 57 contacts, including airline passengers. India is the third country outside of Africa to report the novel clade.
Source : India reports first case of mpox from fast-spreading clade 1b variety

First case of Mpox clade Ib in Thailand

21 August 2024

A 66-year-old European man, who arrived in Thailand last week from an undisclosed African country, has been diagnosed with clade Ib MPXV. Authorities are monitoring 43 close contacts, none of whom have shown symptoms thus far.
Source : The ministry of public health of Thailand. 21 August 2024.

First Mpox Outbreak Reported in Zimbabwe

13 October 2024

Zimbabwe reported its first mpox cases, a 11-year- old child and an adult from two separate towns who recently traveled to South Africa and Tanzania, respectively. The report did not give information on clades involved.
Source: Zimbabwe Records First Mpox Cases - Ministry of Health On High Alert Amid Response Plan Roll Out. 13 October 2024.

Launch of mpox vaccination campaign I DRC

5 October 2024

Since the surveillance system was alerted, 6 suspected cases meeting the definition of mmpox cases have been notified, placed in isolation, treated and sampled. Of the 6 samples taken and sent to the National Public Health Laboratory, one tested positive for Mpox. He is a 30-year-old man who has spent the last 2 weeks in Uganda, a country currently affected by the epidemic.
Source : Ministère de la santé et des affaires sociales. 22 August 2024.

First Mpox Case Reported in Gabon

22 August 2024

Since the surveillance system was alerted, 6 suspected cases meeting the definition of mmpox cases have been notified, placed in isolation, treated and sampled. Of the 6 samples taken and sent to the National Public Health Laboratory, one tested positive for Mpox. He is a 30-year-old man who has spent the last 2 weeks in Uganda, a country currently affected by the epidemic.
Source : Ministère de la santé et des affaires sociales. 22 August 2024.

First case of Mpox reported in the Philippines in 2024

19 August 2024

A 33-year-old Filipino man, with no history of travel outside the country, has been identified as the 10th mpox case reported since the outbreak began, with the previous case detected in December 2023.

Source : The Department of Health of the Philippines, 19 August 2024

First case of Mpox clade Ib in Sweden

15 August 2024

A person who sought medical care in Stockholm has been diagnosed with mpox after returning from a region in Africa currently experiencing a major clade I outbreak. This marks the first detection of clade Ib mpox outside the African continent.

Source : The Public Health Agengy of Sweden,. 15 August 2024.

Ivory Coast Records Four New Mpox Cases

2nd August 2024

Four new non-lethal mpox cases were confirmed in Abidjan, Ivory Coast. All new and previous patients are under treatment and showing favorable progress.

Source : Mpox update (30): Côte d'Ivoire (AB) confirmed cases. | ProMED. 7 August 2024.

First Mpox Outbreak Reported in Uganda

1st August 2024

Uganda's Ministry of Health confirmed two new mpox cases in Kasese District, both imported from the DRC. The cases include a 37-year-old Ugandan woman married to a Congolese man and a 22-year-old Congolese woman, both presenting with skin rash, swollen lymph nodes, and general malaise.

Source : Mpox update (29): Uganda (KS) conf. | ProMED. 4 August 2024.

First Mpox Case Reported in Kenya

31 July 2024

Kenya has confirmed a case of mpox at a Taita Taveta border point with Tanzania. The virus was detected in an individual, reportedly a long-distance truck driver, who was travelling from Uganda to Rwanda through Kenya.

Source : Mpox Update (27): Kenya (Taita Taveta) | ProMED. 2 August 2024.

First Mpox Outbreak Reported in Burundi

28 July 2024

Burundi's Ministry of Public Health declared eight confirmed mpox cases, with no deaths, in Bujumbura Nord, Gitega, and Isare districts, following initial alerts and positive lab results. Patients presented with fever and rash. Sequencing to determine the viral clade are pending. This is the first cases of mpox reported in Burundi.

Source : Outbreak Report, 30 July 2024: Mpox Situation in Africa | Africa CDC. 30 July 2024.

First Mpox Outbreak Reported in Rwanda

25 July 2024

Rwanda's Ministry of Health reported its first mpox outbreak with two confirmed cases in Gasabo and Rusizi districts. The cases, a 33-year-old female and a 34-year-old male, had traveled to DRC and tested positive for mpox Clade Ia sublineage. This is the first cases of mpox reported in Rwanda.

Source : Outbreak Report, 30 July 2024: Mpox Situation in Africa | Africa CDC. 30 July 2024.

DRC granted approval for MVA-BN and LC16 vaccines

27 June 2024

The DRC has approved the emergency use of two smallpox vaccines - MVA-BN (Bavarian Nordic, Denmark) and LC16 (KM Biologics, Japan) - to address the escalating mpox outbreak, involving a novel clade Ib variant.

Source : DR Congo grants emergency use for 2 mpox vaccines | News Brief. CIDRAP. 27 June 2024.

First Mpox Outbreak Reported in South Africa since 2022

May - July 2024

South Africa reported 20 confirmed mpox cases, including three deaths, across three provinces (Gauteng, KwaZulu-Natal, and Western Cape). All cases were symptomatic males aged 17 to 43, mostly self-identifying as MSM and living with advanced HIV disease. None had a history of international travel or attendance at high-risk events, and sexual contact was the reported exposure. Sequencing identified clade IIb sublineage. These are the first mpox cases in South Africa since 2022.

Source : Mpox - South Africa | Disease Outbreak News. World Health Organization. 9 July 2024.

High-level Emergency Regional Meeting on mpox in Africa

11 - 13 April 2024

Health Ministers from several Central and West African countries, along with international partners, convened in Kinshasa to address the ongoing mpox epidemic in the region. They expressed serious concern over the changing transmission dynamics, high mortality rates, and the lack of access to countermeasures. The ministers emphasized the urgent need for a coordinated regional approach, including strengthening surveillance, preparedness, and response efforts at national and cross-border levels. The meeting concluded with the creation of an Africa Taskforce for Mpox Coordination, supported by Africa CDC, WHO, and other partners, to bolster epidemic response and ensure harmonized efforts across the continent.

Source : Communiqué "United in the fight against mpox in Africa" | High-level emergency regional meeting. 13 April 2024.

Mpox Outbreak in DRC: Shifting Patterns and Geographical Expansion

April – September 2023

While the DRC is experiencing his worst mpox outbreak since the beginning of the year, with thousands of cases and hundreds of deaths, three previously unaffected provinces in the southern and eastern parts of the country (Kwango, Kinshasa and South Kivu) have reported outbreaks linked with sustained human-to-human transmission for the first time, without animal exposure. Clusters of patients included adult women and men presenting with anal and genital lesions and who reported sexual contacts prior to symptoms onset. This is the first documented instances of sexual transmission of clade I MPXV viruses.

Source : Mpox (monkeypox) - Democratic Republic of the Congo | Disease Outbreaks News. WHO. 23 November 2023.

WHO lifted PHEIC status for global mpox outbreak

10 May 2023

The WHO announced that the global mpox outbreak no longer constitutes a PHEIC, following the recommendation of the International Health Regulations (IHR) Emergencies Committee, in response to the significant and sustained decline in mpox cases. The Committee recommended transitioning to a long-term strategy to manage the ongoing public health risks posed by mpox.

Source : Fifth Meeting of the International Health Regulations (2005) (IHR) Emergency Committee on the Multi-Country Outbreak of mpox (monkeypox). 11 May 2023.

WHO declared the escalating global mpox outbreak a PHEIC

23 July 2022

WHO declared a Public Health Emergency of International Concern (PHEIC) in response to the escalating mpox outbreak affecting multiple non-endemic countries, who reported for the first time sustained community transmission through sexual contacts, particularly among men who have sex with men (MSM) with multiple sexual partners.

Source : WHO Director-General's statement at the press conference following IHR Emergency Committee regarding the multi-country outbreak of monkeypox. 23 July 2022.

Events linked with clade Ia / Ib MPXV outbreaks - Africa

Events linked with clade IIb lineage B.1 MPXV outbreaks - Global

Fact sheets

This section provides a short overview of of the epidemiology, virology, clinical features and risk assessment related with the disease.

Mpox is a **zoonotic infectious disease** caused by the monkeypox virus (MPXV), belonging to the *Poxviridae* family and Orthopoxvirus genus, similarly to variola virus (the causative agent of smallpox), cowpox virus and vaccinia virus. The animal reservoir remains unknown, but African rodents such as tree squirrels and Gambian pouch rats (*Cricetomys gambianus*) are currently considered to be strong candidates, as they were implicated in international spread.

There are two known clades of MPXV : clade 1 (previously referred to as Congo Basin), originating from eastern regions in Central Africa, and clade 2 (formerly West African clade) prevalent in West Africa. Clades 1 and 2 are further subdivided into four distinct subclades : 1a, 1b, 2a, and 2b. Variants 1b and 2b which emerged in recent years exhibit **APOBEC-3 type mutations**, indicative of viral adaptation to human hosts. Clade I MPXV infections are at greater risk of severe disease, with a **case fatality rate (CFR)** ranging from 3 - 10%, while clade II MPXV generally causes milder symptoms, lower viremia and a reduced lethality rate of 1 - 3%. The global mpox outbreak caused by the clade IIb in 2022-2023 showed a CFR of less than 0.1%. Some factors, beyond virological aspects, such as limited access to medical care or co-existing health conditions, might confound the case fatality rates. In many African countries, a significant proportion of the population is living with untreated or undiagnosed HIV, leading to a mortality rate from mpox that is twice as high in immunocompromised individuals compared to those with healthy immune systems. The higher death rate among children under five years old may also be partly due to malnutrition and limited access to healthcare, particularly in rural regions of DRC.

Clades Ia and IIa are **transmitted from animals to humans** through contact with live and dead animals through hunting or consumption of contaminated bushmeat. Secondary **human-to-human transmission** of these clades occasionally occurs via respiratory droplets, direct close contacts with body fluids or skin abrasions, or through contamined objects and household linens, though such transmission is usually limited to household members. Clades Ib and IIb have demonstrated sustained human-to-human transmission without the need for reintroduction from animal reservoirs. Notably, the 2022-2023 global outbreak was mainly driven by local, in-country transmission through **sexual contacts** among men who have sex with men (MSM), rather than at the animal-to-human interface seen in previous zoonotic outbreaks. Populations at higher risk of zoonotic transmission include small households or communities living in rural areas adjacent to or within tropical forests of Central and West Africa, where animal reservoirs may reside. High-risk groups for community transmissions also include sex workers, gay, bisexual, MSM with multiple sexual partners, or any other individuals with multiple casual sexual partners.

The **incubation period of MPXV** ranges from 2 to 21 days, although some people may contract the infection without developing symptoms. Patients are considered infectious from the time of symptom onset until skin lesions have crusted and a fresh layer of skin has formed underneath.

The **disease** is often mild, self-limiting with symptoms usually resolving spontaneously in **two to four weeks** but may last longer in immunocompromised individuals. A febrile prodrome with fever, muscle aches, sore throat and lymphadenopathy (swollen lymph nodes) appear first and last for 1 to 4 days, followed by cutaneous and/or mucosal rash. Typically, the lesions evolve through macules, papules, vesicles and pustules, before crusting over and desquamating. Lesions can manifest in the face, trunk, limbs, palms, conjunctival, urethral, penile, vaginal, genital and ano-rectal areas. Symptoms can be mild or severe, and patients may develop single or multiple lesions which can be very itchy or painful. Infected individuals remain contagious until all sores are healed, and a new layer of skin has formed. Complications may occur, such as secondary skin infections, septicemia, encephalitis or corneal ulceration. Although rarely fatal, severe systemic forms with multi-organ involvement and higher case fatalities have been observed in vulnerable groups, such as young children, individuals with a weakened immune system or with advanced HIV infection. Contracting mpox during pregnancy may lead to complications, such as congenital mpox, stillbirth or even death of the newborn.

MPXV is classified as a **risk group 3 (RG-3) pathogen** and requires stringent containment and appropriate safety measures to minimize risk to laboratory personnel. Standard operating procedures must be ensured for specimen collection, storage, packaging and transport. All specimens collected for laboratory investigations should be regarded as potentially infectious and handled with caution. Primary preventive vaccination is recommended for health workers, including laboratory personnel at risk for repeated exposure.

Source : Mpox (monkeypox) | Fact Sheets. World Health Organization. 26 August 2024.

Diagnosis and care

This section offers a short overview of currently available countermeasures and recommendations for diagnosis, prevention and care.

Due to the range of health conditions that cause similar-appearing skin lesions, clinical differentiation of mpox is difficult without laboratory diagnosis. Detecting viral nucleic acids using **polymerase chain reaction (PCR)** is the gold standard technique for confirming **MPXV diagnosis,** but its implementation requires dedicated research infrastructure and trained health personnel. The reliability of results depends on the type of biological specimen, with optimal samples obtained directly from skin lesions — whether crusts or exudates — via swabbing. In the absence of visible epidermal wounds, testing can be conducted on mucosal specimens using oropharyngeal or rectal swabs. Blood samples are not recommended for molecular testing since detectable viremia occurs in the early clinical course of infection. In areas with active circulation of multiple orthopoxviruses, diagnostic tests for other conditions should be considered if feasible. **Point-of-care (POC)** and **antigen rapid diagnostic test (AgRDT)** are rapid, cost-effective and easily interpretable diagnostic tools for use by health workers with minimal laboratory training to conduct MPXV diagnosis effectively in the field. POC tests such as GeneXPert (Cepheid, U.S.) and Standard M10 MPX/OPX® (SD Biosensor, South Korea) show promising clinical sensitivity on lesion samples and oropharyngeal swabs for clade I MPXV diagnosis. AgRDT shows high specificity but low sensitivity and their potency for clade I MPXV screening remains to be investigated.

Therapeutic management relies mainly on supportive care, managing pain and preventing further complications. One antiviral, tecovirimat, developed in 2002 to treat smallpox, has been approved by the Food and Drug Administration (FDA) and European Medicines Agency (EMA) as a compassionate use for the treatment of mpox in U.S. and EU/EEA countries. Several clinical studies (UNITY, EPOXI, MOSA, STOMP, PALM007, PLATINUM/PLATINUM-CAN) are underway in different regions of the world to evaluate the clinical efficacy of tecovirimat in treating mpox in adults and children.

There are currently **three vaccines** approved in different jurisdictions for the prevention of mpox. These third-generation smallpox vaccines contain non-replicating or minimally-replicating strains of vaccinia virus such as MVA-BN (Bavarian Nordic, Denmark), LC16 (KMB Biologics, Japan) and OrthopoxVac (Russia). The most commonly administered vaccine has been the MVA-BN, for which a favorable safety profile with mild side effects has been documented. MVA-BN is approved by U.S. Food and Drug Administration (FDA) and European Medicines Agency (EMA) for use in high-risk adult populations against mpox in U.S. (JYNNEOS®), Canada (IMVAMUNE®) and EU/EEA countries (IMVANEX®). 1st and 2nd generation smallpox vaccines widely used in the 1950-1970s, such as the replication-competent vaccines Dryvax and ACAM2000®, also provides cross-protection against mpox, although populations under the age of 40 or 50 years do not benefit from prior smallpox vaccination programs. ACAM2000® is currently approved by the FDA for emergency use in U.S., but is not authorized in EU/EEA countries owing to significant side effects. To date, vaccines have been provided to their most vulnerable populations in 83 countries. However, they are not yet widely available, particularly in countries where the disease is endemic.

On 27th June 2024, **the DRC has granted emergency use approval for two smallpox vaccines**, MVA-BN (Bavarian Nordic, Denmark) and LC16 (KMB Biologics, Japan), in response to the escalating outbreak in the country.

The WHO Strategic Advisory Group of Experts (SAGE) on Immunization **recommended vaccination for the following population groups**: residents of high-risk areas (e.g. rural communities); sex workers, gays, bisexuals, MSM or other individuals with multiple casual sexual partners ; health workers repeatedly exposed to mpox (such as those performing diagnostic tests or providing care); and contacts of mpox patients, including children, household members or in congregate settings.

Source : Mpox (monkeypox) | Fact Sheets. World Health Organization. 26 August 2024.

Scientific articles

This section presents relevant articles published on peer-reviewed scientific journals or pre-print platforms.

MPXV Infection Stimulates a More Robust and Durable Neutralizing Antibody Response Compared to MVA-BN Vaccination.

Selverian CN, Monticelli SR, Jaleta YM, Lasso G, DeMouth ME, Meola A, Berrigan J, Batchelor TG, Battini L, Guardado-Calvo P, Herbert AS, Chandran K, Meyerowitz E, Miller EH.

Published in *Journal of infectious diseases* on 18 October 2024
https://doi.org/10.1093/infdis/jiae515

The authors examined the neutralization of MPXV and VACV by sera from a cohort of convalescent and vaccinated individuals at 1- and 8-months post-exposure. Convalescent individuals displayed higher neutralizing antibody titers against MPXV than vaccinated and MPXV-naïve persons at one-month post-exposure. Neutralizing antibody titers had waned significantly in both groups at 8 months. The authors conclude this data suggests additional vaccine strategies are needed to elicit a durable humoral response and prevent breakthrough infections

Evaluation of a multiplexed immunoassay for assessing long-term humoral immunity Orthopoxviruses.

Hicks B, Jones S, Callaby H, Bailey D, Gordon C, Rampling T, Houlihan C, Linley E, Tonge S, Oeser C, Jones R, Pond M, Mehta R, Wright D, Hallis B, Rowe C, Otter A.

Published in *Vaccine* on 18 October 2024
https://doi.org/10.1016/j.vaccine.2024.126453

The study aimed to assess a multiplexed solid-phase electrochemiluminescence immunoassay (Meso Scale Discovery (MSD)) for simultaneous detection of antibodies against MPXV, including A35, E8 and M1 antigens, and Vaccina Virus (VACV) homologous. Sensitivity and specificity were evaluated with paediatric negatives (n = 215), pre- and post-IMVANEX vaccinated (n = 80), and MPXV (Clade IIb, n = 39) infected serum samples. The assay demonstrated high specificity (75.68 % (CI: 69.01–81.29) - 95.98 % (CI:92.54–97.87)) and sensitivity (62.11 % (CI:52.06–71.21) - 98.59 % (CI:92.44 %–99.93 %)) depending on the Orthopoxvirus antigen. Preferential binding was observed between MPXV-infected individuals and MPXV antigens, while vaccinated individuals exhibited increased binding to VACV antigens. These results highlight differential binding patterns between antigen homologues in related viruses. Overall, this assay demonstrates high sensitivities in detecting antibodies for multiple relevant MPXV and VACV antigens post-infection and post-vaccination.

Diagnostic and surveillance testing capability for mpox in the EU/EEA, September 2024.

Lagerqvist N, Beser J, Bakonyi T, Gossner CM, Palm D.

Published in *Eurosurveillance* on 17 October 2024
https://doi.org/10.2807/1560-7917.es.2024.29.42.2400632

The article discusses the 2024 mpox (monkeypox) situation, where the WHO declared a Public Health Emergency due to rising mpox cases in the Democratic Republic of the Congo and neighboring regions. It reports on a survey conducted by the European Centre for Disease Prevention and Control (ECDC) to assess the lab capabilities of EU/EEA countries in diagnosing and characterizing mpox. All 30 countries surveyed had the capability to diagnose mpox using PCR, with most able to differentiate between virus clades and subclades. The article highlights the importance of genome sequencing for monitoring viral evolution and encourages data sharing to enhance understanding of the disease's transmission and spread. It stresses the need for EU countries to detect and report clade I cases to support public health interventions.

Monkeypox Clade Ib virus introduction into Burundi: first findings, July to mid-August 2024.

Nzoyikorera N, Nduwimana C, Schuele L, Nieuwenhuijse DF, Koopmans M, Otani S, Aarestrup FM, Ihorimbere T, Niyomwungere D, Ndihokubwayo A, Diawara I, Niyomwungere A, Nizigiyimana D, Uwineza MN, Oude Munnink BB, Nyandwi J.

Published in *Eurosurveillance* on 17 October 2024
https://doi.org/10.2807/1560-7917.es.2024.29.42.2400666

From May 2023, a sharp increase of mpox cases due to MPXV Clade I was observed across the Democratic Republic of Congo (DRC), with cases occurring in areas where MPXV had not prior been detected. MPXV reached Burundi by 25 July 2024, when the first three cases were reported located in western Burundi, bordering the DRC. Up to 20 August 2024, 170 mpox cases have been confirmed by RT-PCR in Burundi. All confirmed cases were caused by MPXV of Clade Ib. Overall, the mpox outbreak spread to many parts of the country affecting 26 of the 49 health districts. All the positive cases were hospitalised and no death has been reported. The age of the confirmed mpox cases ranged between 2 months and 65 years (mean: 17.05 years): 48% of the cases were children under 15 years old and 30% were between 15 and 29 years old. In total, 42.4% were female and 57.6% male. The public health measures put in place since the beginning of the outbreak have not reduced the outbreak transmission, showing the importance of further intensified public health interventions.

Characterising global risk profiles of Mpox clade Ib importation.

Asakura TR, Jung SM, Jin S, Hu G, Endo A, Dickens BL.

Published in *J Travel Med* on 16 October 2024
https://doi.org/10.1093/jtm/taae136

The authors estimated the ranking of countries outside of Africa according to the volume of mpox clade 1b needed in RDC to receive the first imported case in each country. They used the monthly volume of flights from RDC to countries outside Africa and the number of mpox clade1 cases in the 2 Kivu provinces (RDC) from August 2024. Simulations performed suggested that neither Sweden (36th [95% range: 3rd-74th] country to import nor Thailand (47th [6th-88th]), reporting the first two importations, were among the countries to expect the earliest importation. The authors suggest potential undetected importations in countries with high travel volume.

Genetic sequencing analysis of monkeypox virus clade I in Republic of the Congo: a cross-sectional, descriptive study.

Asakura TR, Jung SM, Jin S, Hu G, Endo A, Dickens BL.

Published in *Lancet* on 16 October 2024
https://doi.org/10.1016/s0140-6736(24)02188-3

The authors estimated the ranking of countries outside of Africa according to the volume of mpox clade 1b needed in RDC to receive the first imported case in each country. They used the monthly volume of flights from RDC to countries outside Africa and the number of mpox clade1 cases in the 2 Kivu provinces (RDC) from August 2024. Simulations performed suggested that neither Sweden (36th [95% range: 3rd-74th] country to import nor Thailand (47th [6th-88th]), reporting the first two importations, were among the countries to expect the earliest importation. The authors suggest potential undetected importations in countries with high travel volume.

MVA-BN vaccine effectiveness: A systematic review of real-world evidence in outbreak settings.

Mason LMK, Betancur E, Riera-Montes M, Lienert F, Scheele S. MVA-BN vaccine effectiveness: A systematic review of real-world evidence in outbreak settings.

Published in *Vaccine* on 15 October 2024
https://doi.org/10.1016/j.vaccine.2024.126409

Medline (via PubMed), Embase, and LILACS were searched, as well as grey literature sources and publications' bibliographies to identify observational studies published between Jan/2022 Feb/2024 that estimate the vaccine effectiveness (VE) of MVA-BN against mpox or provide risk measures that allow calculation of these VE estimates. The authors identified 16 records. Where the study population was exclusively or primarily those receiving pre-exposure prophylactic vaccination, the adjusted VE estimates ranged from 35 % to 86 % (n = 8 studies) for one dose and from 66 % to 90 % (n = 5) for two doses. Where only post-exposure prophylactic vaccination was assessed, adjusted VE estimates were reported for one dose only at 78 % and 89 % (n = 2). Additionally, MVA-BN reduced the risk of mpox-related hospitalization in one study and the severity of mpox clinical manifestations in two studies.

This section provides a digested list of new articles published since the last review. The complete repository in Excel format can be found here.

Technological landscape

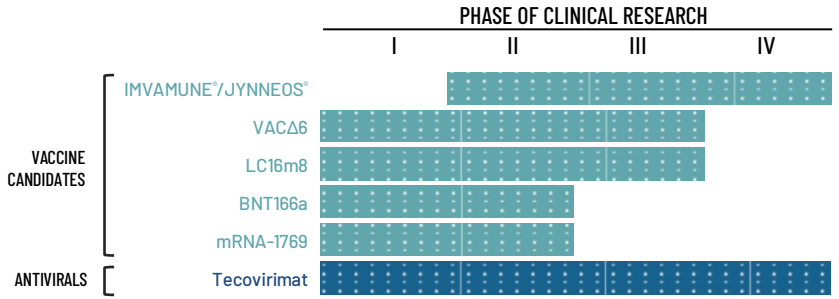
This section outlines the current pipeline of drug development, clinical trials and technologies aimed at preventing and treating the disease.

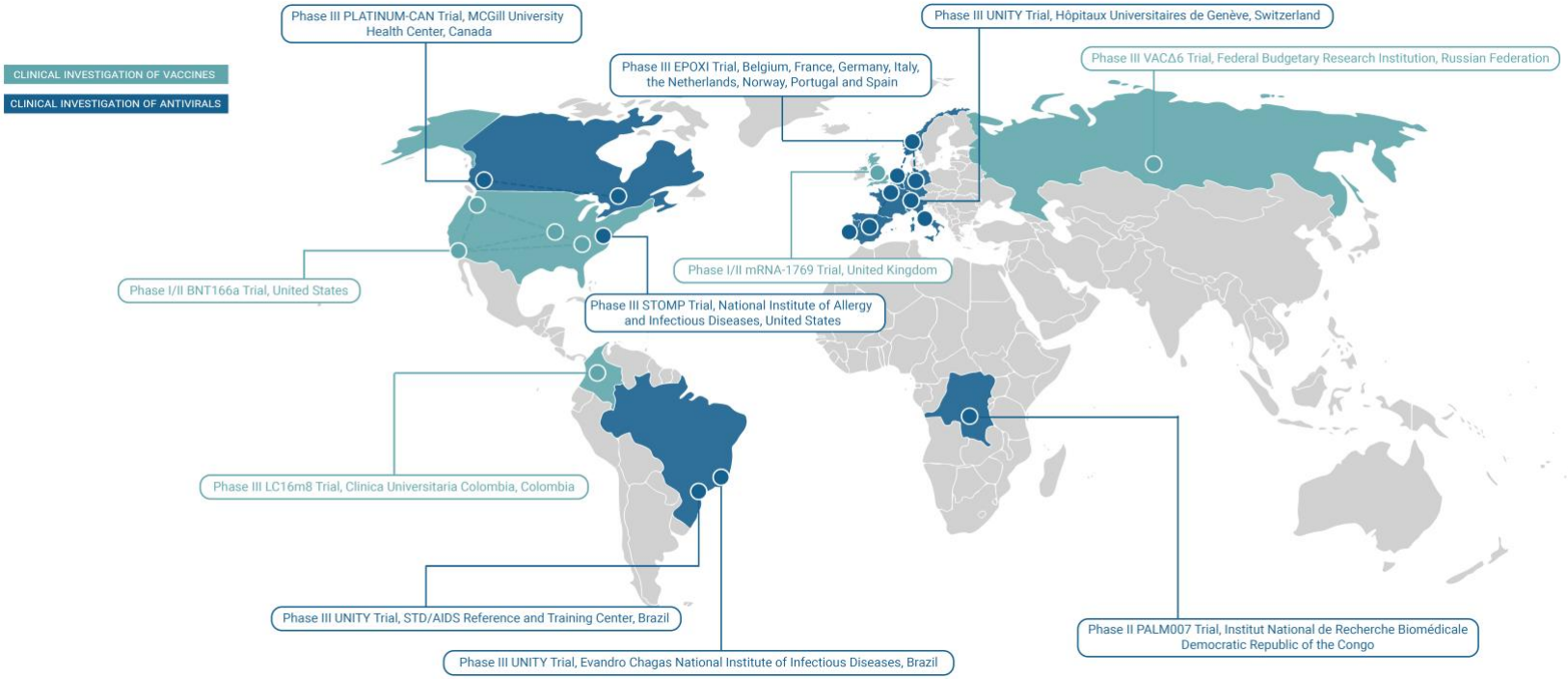
VACCINES	**IMVAMUNE®/JYNNEOS® IMVANEX®**	Viral attenuated, non-replicating vector (MVA-BN strain)	Phase 3/4	Third-generation smallpox vaccine authorized in EU/EEA countries, U.S. and Canada for protection against MPXV in adults. Case-control studies estimated the vaccine effectiveness at 66-86% in high-risk cohorts, with favorable safety profile and mild side effects. Limited data on use in children. Have been approved for emergency use in DRC on 27 June 2024.
	VACΔ6 (OrthoPoxVac®)	Live-cell based vaccine	Phase 3	Licensed in the Russian Federation. Currently being evaluated for safety and protection against smallpox, mpox and other orthopoxviruses.
	LC16m8	Viral attenuated, low replicating vector	Phase 3	Authorized for active immunization against smallpox in Japan since 1975. This vaccine has been licensed by Japan to provide protection against MPXV in adults and children. Currently being evaluated for safety and protection against mpox in high-risk populations. Have been approved for emergency use in DRC on 27 June 2024.
	BNT166a, BNT166c	multivalent mRNA vaccine	Phase 1/2	Developed by BioNTech. Two mRNA based-multivalent vaccines developed for active immunization against mpox. Provides protection against MPXV clade I/IIb in mice and macaques. BNT166a is currently being evaluated for safety, tolerability and immunogenicity.
	mRNA-1769	mRNA vaccine	Phase 1/2	Developed by Moderna. Currently being evaluated for safety, tolerability and immunogenicity in adults.
	ACAM2000®	live vaccinia virus (NYCBH strain)	Restricted use	Second-generation smallpox vaccine. Currently approved by FDA for emergency use in U.S. Not authorized in EU/EEA countries due to significant side effects.
	VACV Tian Tan	live vaccinia virus (Tian tan strain)	Restricted use	First-generation smallpox vaccine used routinely in China and discontinued in 1981. Half of vaccinated individuals maintain neutralized antibodies and long-lasting humoral immunity even after 40 years, which provides cross-protection against MPXV.
	Dryvax	live vaccinia virus (NYCBH strain)	Restricted use	First-generation smallpox vaccines which made significant contribution to smallpox eradication campaigns. Associated with serious side effects.
TREATMENTS	**Tecovirimat (TPOXX®)**	Antiviral	Phase 2/3	The first FDA-licensed drug for the treatment of smallpox. Approved in 2022 for the treatment of mpox in U.S. and EU/EEA countries. Demonstrated therapeutic effects against mpox in animal models. Safe and well-tolerated in healthy volunteers. The MPX-RESPONSE consortium, funded by European Commission and participating countries, includes three phase III clinical trials covering different geographic regions: UNITY in Argentina, Brazil and Switzerland, launched in March 2023; EPOXI in Europe which started recruiting in August 2024; MOSA in 3 to 10 African countries and expected to launch end of October 2024.
	NIOCH-14	Antiviral	Phase 1	Analogue of tecovirimat licensed in the Russian Federation for the treatment of mpox. Has demonstrated similar effectiveness than tecovirimat in mice models. Clinical efficacy against mpox is still uncertain.
	Cidofovir / Brincidofovir	Antiviral	Restricted use	Approved by FDA for the treatment of smallpox. Showed *in vivo* and *in vitro* antiviral activities against several orthopoxviruses. No clear benefit in three treated mpox patients in a recent observational study.
	Intravenous Vaccinia Immune Globulin (VIGIV)	Human anti-vaccinia antibodies	Restricted use	Considered for emergency use in mpox patients with severe complications or unable to mount an immune response in the U.S. Data on the effectiveness of VIGIV for mpox are lacking.

Source : Clinical Trials | National Institute of Health.

Ongoing clinical studies and sites of investigation

This section provides an overview of clinical trials in progress. Further details regarding ongoing interventional studies can be found here.





Relevant news

This section presents official reports from health agencies, manufacturers and press releases with reliable sources.

Weekly Special Press Briefing on the Mpox Outbreak and other Health Emergencies in Africa.

Published by AfricaCDC on 28 October 2024
https://africacdc.org/news-item/weekly-special-press-briefing-on-the-mpox-outbreak-and-other-health-emergencies-in-africa-4/

Africa CDC provide updates on the Mpox outbreak situation in affected Member States, as well as the ongoing Marburg outbreak in Rwanda on Thursday, 31 October 2024.

Mpox Multi-country external situation report no. 41, published 26 October 2024.

Published by WHO on 26 October 2024
https://www.who.int/publications/m/item/multi-country-outbreak-of-mpox--external-situation-report--41--26-october-2024

In September 2024, the last month for which complete global surveillance data is available, 2763 confirmed mpox cases were reported. This is the highest number of cases since November 2022 and marks an increasing trend in the number of reported confirmed mpox cases globally, driven by the increase in the African Region, followed by the Western Pacific Region.

Mpox-measles co-infections reported in hard-hit DR Congo provinces.

Published by CIDRAP on 25 October 2024
https://www.cidrap.umn.edu/mpox/mpox-measles-co-infections-reported-hard-hit-dr-congo-provinces

Mpox activity in Africa continues at a steady pace, and though responders are seeing some promising trends, some countries face new challenges, including a rise in mpox-measles co-infections in children in two Democratic Republic of the Congo (DRC).

Mpox-measles co-infections reported in hard-hit DR Congo provinces.

Published by GOV.UK on 24 October 2024
https://www.gov.uk/government/news/uk-announces-support-to-help-uganda-manage-mpox-outbreak

The UK has announced up to £1 million (UGX 4.9 billion) to support Uganda's response to the ongoing mpox outbreak in the country.

Mpox risk to Europe "low" says EU official, but virus and bird flu need monitoring.

Published by BMJ on 24 October 2024
https://www.bmj.com/content/387/bmj.q2240

"As we look at it from the European perspective, our assessment is that the risk to Europe is low. The conditions for further spread of the virus—in the form we know it now—are not good from the virus's perspective. We believe that it will be possible to contain it if more people become infected."

Guidelines and practical information

This section lists official manuals of recommendations for clinical practice or public health policy published by leading health organizations.

17 September 2024	NIAID Research Agenda for 2024 Mpox – September 2024
12 September 2024	Mpox: scenarios and technical elements of preparedness and response for clade I (UKHSA)
August 29, 2024	Avis du collège de la Haute Autorité de santé relatif à la stratégie de vaccination contre le mpox (HAS)
August 19, 2024	Temporary recommendations issued by WHO to States Parties in relation to the public health emergency of international concern associated with the upsurge of mpox (WHO)
May 24, 2024	Strategic framework for enhancing prevention and control of mpox - 2024-2027 (WHO)
March 20, 2024	Surveillance, case investigation and contact tracing for mpox (monkeypox): Interim guidance, 20 March 2024 (WHO)
November 9, 2023	Diagnostic testing for the monkeypox virus (MPXV): interim guidance, 9 November 2023 (WHO)
May 13, 2023	Infection au Monkeypox virus : procédure opérationnelle de prélèvement (COREB)
April 27, 2023	Infection par le Monkeypox virus : repérer et prendre en charge un patient en France (COREB)
April 20, 2023	Définition de cas et contacts et conduite à tenir pour la recherche des contacts (SPF)
April 14, 2023	Public health considerations for mpox in EU/EEA countries (ECDC)
March 20, 2023	Public health advice on mpox and congregate settings: settings in which people live, stay or work in proximity (WHO)
March 9, 2023	Public health advice for gay, bisexual and other men who have sex with men on the recent outbreak of mpox (WHO)
December 16, 2022	Révision du plan de lutte contre la variole (HCSP)
November 20, 2022	Monkeypox strategic preparedness, readiness, and response: Operational planning guidelines (WHO)
November 16, 2022	Vaccines and immunization for monkeypox: interim guidance (WHO)
October 5, 2022	Monkeypox Strategic Preparedness, Readiness, and Response Plan (WHO)
September 30, 2022	Public health advice for sex workers on mpox (WHO)
September 1, 2022	Risk communication and community engagement public health advice on understanding, preventing and addressing stigma and discrimination related to mpox (WHO)
August 16, 2022	Monkeypox infection prevention and control guidance for primary and acute care settings (ECDC)
June 30, 2022	Risk communication and community engagement approaches during the monkeypox outbreak in Europe, 2022 (ECDC/WHO)
June 28, 2022	Considerations for contact tracing during the monkeypox outbreak in Europe, 2022 (ECDC)
June 10, 2022	Clinical characterization of mpox including monitoring the use of therapeutic interventions (WHO)
June 10, 2022	Clinical management and infection prevention and control for monkeypox: Interim rapid response guidance (WHO)
June 10, 2022	Navigating monkeypox: considerations for gay and bisexual men and other men who have sex with men (ECDC)
June 9, 2022	Monkeypox - Aide au diagnostic dermatologique et au traitement symptomatique (COREB)
June 09, 2022	avis relatif à la conduite tenir pour les cas confirmés d'infection à Monkeypox virus (MPXV) à risque de forme grave et pour les personnes contacts à risque d'infection par MPXV (HCSP)
July 09, 2022	Mesures de prévention vis-à-vis de l'infection à Monkeypox virus (HCSP)
May 24, 2022	avis relatif à la conduite à tenir autour d'un cas suspect, probable ou confirmé d'infection à Monkeypox virus (HCSP)