

Mpox Outbreak in DRC 2023 - General informations

The « General informations » section presents a detailed overview of the outbreak, including case definitions and guidelines by health authorities
The content of this document are subject to change as the health situation evolves. All informations comes from a valid and credible source.

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<https://anrs.fr/en/emergence-units/cellule-emergence-mpox-drc-2023/>

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Overview

Source : Mpox (monkeypox) - Democratic Republic of the Congo | Disease Outbreak News. World Health Organization. 23 November 2023.

TIMELINE

- Since January 2023, a nationwide resurgence of MPXV infections has been experienced in Democratic Republic of the Congo (DRC), along with an expansion to new geographical areas that were previously unaffected (including urban areas such as Kinshasa, the capital home to 17 million inhabitants).

- As of 6 December 2023, a total of 12,569 suspected cases and 581 deaths have been reported across 23 of the 26 provinces. The provinces who reported the highest number of suspected cases are Equateur (North-West), Maindombe (West), Sankuru (Central) and Tshopo (North-Central). Of the 1,106 suspected cases (8.8%) that were tested for mpox by PCR assay, 65% were confirmed positive for clade 1 MPXV. The annual incidence of cases is now the highest ever recorded in DRC. This upsurge appears to be unrelated to the multi-country outbreak of Monkeypox caused by clade II viruses declared in May 2022, as only clade 1 viruses are currently circulating in DRC.

- On 21 November 2023, the Ministry of Health of DRC informed the World Health Organization (WHO) of five confirmed cases of Monkeypox viruses (MPXV) among locals - four men and one woman - who had engaged sexual relations with a Belgian resident exhibiting genital and anal lesions. The National Institute for Biomedical Research (NIBR) shortly confirmed that the Monkeypox strains identified belong to phylogenetic clade 1. This is the first documented instance of sexual transmission of clade 1 Monkeypox viruses.

- On 29 January 2024, the WHO released an update on the epidemiological situation of mpox in Central African nations, disclosing 14,600 infections and 901 recorded deaths throughout the entire year of 2023. These numbers are likely underestimated due to limited availability and access to healthcare facilities and financial constraints in seeking medical attention. Children under the age of 15 constituted the most affected group, accounting for 65% of mpox reported cases and 75% of fatalities. Disease contraction and spreading was frequently occurring during playtime interactions. As of April 2023, only 34 cases have been reported among sex workers in the DRC, leaving the full extent of clade 1 MPXV sexual transmission yet to be determined.

- On 17 March 2024, the Ministry of Health of DRC notified the WHO of an update regarding the number of MPXV human cases in the country. Health authorities reported 14,626 suspected cases and 654 deaths in the full year of 2023, resulting in a case-fatality rate (CFR) of 4.5%.

- As of 29 March 2024, a total of 4,169 suspected cases of mpox and 279 associated deaths in the DRC has been notified on the latest Africa CDC Surveillance Report. Children account for two thirds of the reported mpox cases.

EPIDEMIOLOGY

- Mpox is a **sylvatic zoonosis** with incidental human infections that usually occur sporadically in forested parts of Central and West Africa, where it is considered endemic. It is caused by the monkeypox virus (Orthopoxvirus genus). The animal reservoir remains unknown, although is likely to be among rodents.
- **There are two known clades of MPXV** : clade I, previously known as the Congo Basin clade, and clade II, previously called the West African clade. Clade II further divides in two subclades : clade IIa and clade IIb. **The case fatality ratio (CFR)** for MPXV has been documented to be around 3-6% for past outbreaks in Africa, with mortality mostly affecting young children. During the 2022 multi-country outbreak, the CFR was approximately 0.03%.
- The virus is **transmitted from animals to humans** through contact with live and dead animals through hunting or consumption of contaminated bushmeat. **Human-to-human transmission** of MPXV mainly occurred through direct contact with lesions, body fluids, respiratory droplets or contaminated materials, such as clothing or linens. However, the spread of the multi-country outbreak of clade IIb MPXV in 2022 was mainly driven by transmission via sexual contact among men who have sex with men, changing the paradigm in the way MPXV can be transmitted. Prior to November 2023 in DRC, no formally documented cases of sexual transmission of clade I MPXV were registered.
- Rural areas, where the animal reservoir may reside, are at higher risk of zoonotic transmission of MPXV. Small household or community who are in close contact with an infected individual are at higher risk of infection. The new features of modes of transmission for clade I MPXV now categorize sex workers and men who have sex with men as a population at risk.
- The **incubation period of MPXV** ranges from 2 to 21 days, although some people can acquire 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 self-limiting with symptoms usually resolving spontaneously in **two to four weeks**. 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 skin and/or mucosal rash. Typically, the lesions evolve through macules, papules, vesicles and pustules, before crusting over and desquamating. Lesions mainly affect the palms of the hands and the soles of the feet but can also manifest in the conjunctival, urethral, penile, vaginal, ano-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. Complications may occur, such as secondary skin infections, septicemia, encephalitis or corneal ulceration. Children and immunocompromised individuals are particularly at risk for severe forms of the disease. Monkeypox during pregnancy may lead to complications, such as congenital mpox or stillbirth.
- **Therapeutic management** relies mainly on supportive care, managing pain and preventing further complications. Several antivirals, such as tecovirimat, originally developed to treat smallpox, have been used to treat mpox and several studies are underway.
- 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 favourable 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 vaccine ACAM2000®, also provides cross-protection against mpox, although populations under the age of 40 or 50 years do not benefit from prior smallpox vaccination programmes. ACAM2000® is currently approved by the FDA for emergency use in U.S., but is not authorised 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.
- MPXV is classified as a **risk group 3 (RG-3) pathogen** and requires stringent containment and appropriate safety measures to minimise 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.
- WHO assesses the risk posed by the outbreak as **high** at the international level. WHO evaluated a significant risk of further mpox spread to **neighbouring countries** (Central African Republic, Angola, Zambia, Tanzania, Burundi, Rwanda, Uganda and South Sudan) or to those sharing a high cultural identity with DRC.



Case definition

Source : Surveillance, case investigation and contact tracing for mpox (monkeypox): interim guidance, 22 December 2022

CONFIRMED	Any person, alive or dead, meeting the case definition for a suspected or probable case and is laboratory confirmed for MPXV by detection of unique sequences of viral DNA by real-time polymerase chain reaction (PCR) assay and/or sequencing – from lesion fluids, skin specimens or crusts.
PROBABLE	<p>Any person, alive or dead, presenting or having presented with an unexplained acute skin rash, mucosal lesions or lymphadenopathy (swollen lymph nodes) in the conjunctival, urethral, penile, vaginal, ano-genital, ano-rectal regions or elsewhere on the body.</p> <p>AND one or more of the following :</p> <ul style="list-style-type: none"> - has an epidemiological link with a probable or confirmed case : face-to-face exposure, including health workers without eye and respiratory protection, direct physical contact with rash or skin lesions or contact with contaminated materials such as clothing, bedding or utensils within 21 days before symptoms onset. - Identifies as gay, bisexual or other cis or trans man who has sex with men. - Reported multiple and/or casual sexual partners in the 21 days before symptoms onset. - Has detectable levels of anti-orthopoxvirus (OPXV) IgM antibodies (during the period of 4 to 56 days after rash onset); or a four-fold rise in IgG antibody titer based on acute and convalescent samples ; in the absence of a recent smallpox/mpox vaccination or other known exposure to OPXV. - Has a positive test result for orthopoxviral infection (e.g., OPXV-specific PCR without MPXV-specific PCR or sequencing).
SUSPECTED	<p>Any person who is a contact of a probably or confirmed monkeypox case in the 21 days before the onset of signs or symptoms, and who presents with any of the following : acute onset of fever (> 38.5°C), headache, myalgia, back pain, profound weakness or fatigue.</p> <p>Any person presenting with an unexplained acute skin rash, single or multiple mucosal lesions or lymphadenopathy (swollen lymph nodes). Lesions can manifest in the conjunctival, urethral, penile, vaginal, ano-genital, ano-rectal region or elsewhere on the body</p> <p>AND for which common causes of disseminated rash or discrete skin lesions do not fully explain the clinical picture :</p> <ul style="list-style-type: none"> - varicella zoster (VZV, chickenpox) - herpes simplex (HSV) - primary or secondary syphilis (treponema pallidum) - disseminated gonococcal infection - measles - scabies - bacterial skin and soft tissue infections - chancroid - medication, food, household chemicals or other types of allergies (e.g. plants)
CONTACT	<p>Any person who has been exposed to an infected person during the period from the onset of the index case's first symptoms to its recovery phase through :</p> <ul style="list-style-type: none"> - direct skin-to-skin and skin-to-mucosal or mouth-to-mucosal contact (such as touching, hugging, kissing, sexual contact) - contact with contaminated materials such as clothing, bedding or surfaces during handling of laundry or cleaning of contaminated rooms - prolonged face-to-face respiratory exposure in close proximity (inhalation of respiratory droplets) - eye mucosal exposure to lesion material (e.g. scabs, crusts, fluids) from an infected person - The above also apply for health workers potentially exposed in the absence of proper use of personal protective equipment
DISCARDED	A suspected or probable case for which laboratory testing of lesion fluid, skins specimens or crusts by PCR and/or sequencing is negative for MPXV. A suspected or probable case should not be discarded based on a negative result from an oropharyngeal, anal or rectal swab or from a blood test alone.



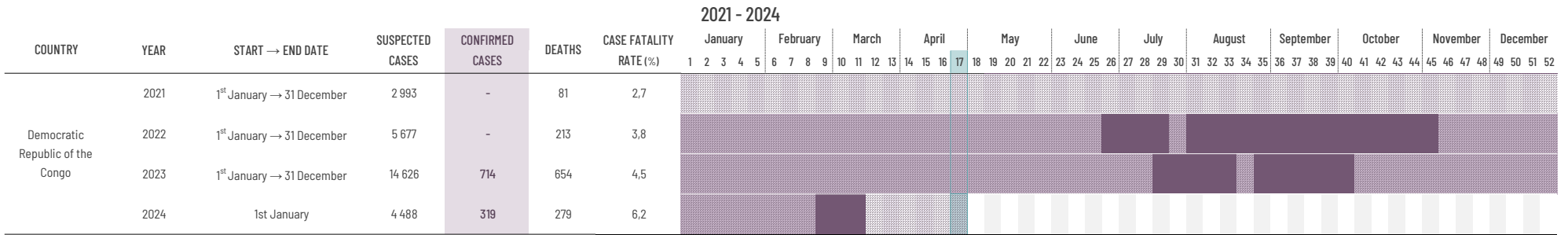
Guidelines and practical informations

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 22, 2022	Surveillance, case investigation and contact tracing for mpox (monkeypox): interim guidance, 22 December 2022 (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 à 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)

Mpox Outbreak in DRC 2023 - Current status

The « Current status » section shows the outbreak chronology and the reported cases by geographical location
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Outbreak timeline and reported cases



Source : Weekly Event Based Surveillance Report. Africa Centres for Disease Control and Prevention. 29 March 2024

Current week : 17

REPORTED CASES EPIDEMIC PEAK NO DATA

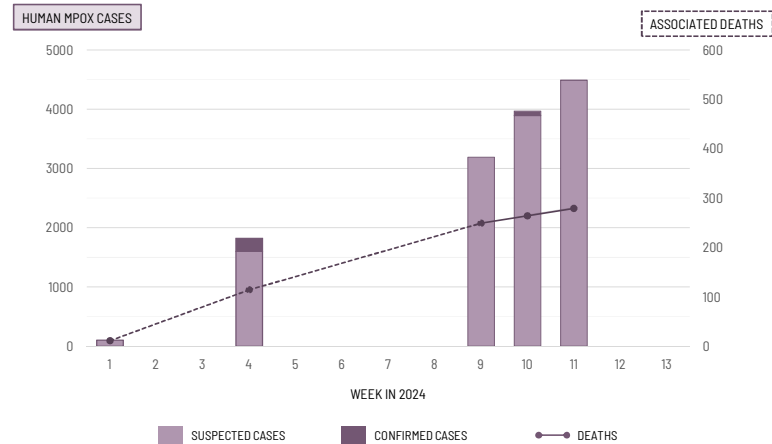


Fig. 1. Reported cases and deaths of human mpox in DRC in 2024 - As of 29th March.

Mpox Outbreak in DRC 2023 - Relevant news

The « Relevant news » section presents official reports from health agencies and press releases with reliable sources

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Date	Source	Type of publication	Title	Key facts
02/04/2024	Bavarian Nordic	Announcement	Bavarian Nordic Announces Commercial Launch of Mpox Vaccine in the U.S.	Bavarian Nordic has announced that JYNNEOS®, the only FDA-approved mpox vaccine, is now commercially available in the U.S. Since 2022, JYNNEOS has been accessible through public health clinics and interim guidance from CDC. Updated recommendations in October 2023 now include routine use of JYNNEOS for at-risk individuals aged 18 and older. Leveraging existing distribution networks beyond public health channels is marking a significant expansion in access to smallpox vaccine, now available for order by healthcare providers through wholesalers, local pharmacies and physician offices.
01/04/2024	Emerg Infect Dis	Dispatch	Co-Circulating Monkeypox and Swinepox Viruses, Democratic Republic of the Congo, 2022	The National Program for Mpox and Viral Hemorrhagic Fevers in the DRC has initiated an investigation aimed at expanding poxvirus surveillance across the territory. Recently, samplings from domestic animals and livestock have also been included in the surveillance effort due to their close proximity to humans, which creates an environment conducive to virus spillover. As part of this investigation, an alert was issued in Tshuapa, a forested province in northwest DRC, following reports of suspected mpox cases among farm owners and residents, as well as pig deaths exhibiting pox-like lesions. Subsequent sequencing confirmed the co-circulation of both MPXV and swinepox virus in this locality within the DRC.
01/04/2024	CIDRAP	News	Studies highlight waning antibodies after mpox vaccination	Two new studies shed light on the durability of antibody levels produced after vaccination with JYNNEOS®. The first study, conducted in Sweden, examined 100 men who have sex with men (MSM), revealed that less than half of the participants without prior smallpox vaccination had any detectable neutralizing antibodies 28 days after the second dose, while individuals who had previously received a smallpox vaccine exhibited significantly higher antibody levels. The second study, conducted in the Netherlands, corroborated these findings, demonstrating a notable decline in antibody levels among individuals without pre-existing immunity one year after the second vaccination. Consequently, participants with childhood smallpox vaccination exhibited a prolonged humoral response over time, indicating the potential importance of prior smallpox vaccination in building immunity against mpox.
22/03/2024	CIDRAP	News	DR Congo mpox outbreak expands, becomes deadlier	The overall proportion of deaths associated with mpox disease in the DRC is rising according to the WHO, with a higher case-fatality rate (CFR) of 7% compared to the global CFR of less than 0.2%. So far, the DRC has reported 3,941 suspected mpox cases this year, 271 of them fatal. Children make up two-thirds of reported cases, with infants and young children at higher risk of complications and death. Diagnostic challenges have led to only a fraction of cases being lab-confirmed in the country.
15/03/2024	Associated Press News	News	Republic of Congo reports its first mpox virus cases, in several regions	The Republic of Congo has reported its first cases of mpox in several regions. According to the ministry, a total of 43 cases have been recorded, across nine out of the country's 12 departments. Currently, no information regarding the circulating clade and its potential connection to the ongoing outbreak in the DRC since November 2023 have been disclosed.
15/03/2024	CIDRAP	News	More than 600 dead in spreading DR Congo mpox outbreak as Republic of Congo reports its first cases	The country's health ministry and the DRC office of the World Health Organization declared that 14,626 suspected cases were reported, with 654 deaths, for a case-fatality rate (CFR) of 4.5% in the full year of 2023. Within the first nine weeks of 2024, 3,576 suspected mpox cases and 265 deaths have been reported in the DRC, for an estimated CFR of 7.4%. Furthermore, an international research team sequenced mpox viral genomes from 10 hospitalized patients in the Kamituga health zone in South Kivu and found that the South Kivu outbreak resulted from a separate viral introduction, most likely of animal origin.

12/03/2024	Nature Med	Correspondence	Mpox continues to spread in Africa and threatens global health security	Despite the global efforts on enhancing mpox surveillance, data sharing and accelerating vaccine development and deployment following the declaration of mpox as a PHEIC, the situation of mpox in Africa is deteriorating. The African Union Commission (AUC) and Africa Centres for Disease Control and Prevention (Africa CDC) are making deliberate efforts by calling for a new public health order and advocating for governments as well as regional and global actors to support the investments in African public health institutions along with the implementation of local manufacturing of vaccines, diagnostics and therapeutics in the African continent as a strategic step to attaining global health security.
07/03/2024	CIDRAP	News	Heterosexual transmission found in DR Congo mpox outbreak	Researchers interviewed 51 of 164 patients who were admitted to Kamituga hospital on September 2023. Of that group, 24 were professional sex workers. Heterosexual partners were mainly affected, suggesting that heterosexual contact may be the main form of transmission. The investigators wrote that professional sex workers –primarily young women–were the dominant occupational group, suggesting that they and their clients may be at higher risk for contracting mpox.
04/03/2024	Nature Reviews Drug Discovery	Research Highlight	Monkeypox mRNA vaccine protects mice and macaques	To address the need for novel, potent, safe and scalable MPXV vaccines, two candidate multivalent MPXV mRNA vaccines have been designed, encoding MPXV proteins from the two infectious forms of the virus, extracellular and mature virions (EVs and MVs).The immunogenicity and the protective efficacy of BNT166a and BTN166c were first evaluated in mice, showing strong MPXV-neutralizing antibody titres and 100% survival rates after being challenged with clade I MPXV. The BNT166a vaccine was also effective in a nonhuman primate model, supporting the clinical development of this mRNA vaccine, which is now undergoing a phase I/II clinical study.
29/02/2024	Nature	Research Highlight	Mpox's surge was stopped by behaviour change – before vaccine rollout	Researchers found that behavioural changes, such as a rise in willingness to seek quick medical attention, are more likely to have slowed the initial outbreak than smallpox vaccination. Furthermore, additional introductions of the virus in a community did little to prolong transmission, as it spread quickly and undetected. Implementing travel bans would have not slowed the outbreak, according to the researchers.
02/02/2024	CDC	Letter	No Evidence for Clade I Monkeypox Virus Circulation, Belgium	In response to concerns regarding whether or not the index case has been contaminated on Belgian territory, the Institute of Tropical Medicine (Antwerp, Belgium) re-examined 296 stored samples from Belgian mpox patients using a clade I-specific PCR testing.The researchers confirmed that none of examined samples tested positive for clade I MPXV and the investigations regarding the index case's history are still ongoing.
30/01/2024	CDC	Dispatch	Residual Immunity from Smallpox Vaccination and Possible Protection from Mpox, China	The Vaccinia virus Tiantan strain (VTT) was historically used during the smallpox vaccination campaign in China. Due to the significant sequence homology in their surface proteins, antibodies induced by smallpox vaccines may confer protection against Monkeypox virus (MPXV). In a cross-sectional cohort study, serum samples from 1070 volunteers residing in Beijing were examined to assess IgG titers against VTT. The overall VTT seropositivity in participants born before 1980 was found to be 50.2% (240/478). Among a small subset of participants, about 71.4% had memory B-cell responses, and 65.7% had memory T-cell responses to VTT. However, the prevalence of neutralizing antibodies (NAb) against VTT was relatively low, standing at 28.7% (137/478) in individuals born before 1980.
18/01/2024	CIDRAP	News	Wastewater testing helpful in tracking mpox outbreaks	A new study published in <i>Morbidity and Mortality Weekly Report</i> shared findings regarding the routine surveillance of mpox in wastewater. Samples were collected from August 2022 until May 2023, representing thousands to millions of individuals. The probability that at least one person was shedding virus when a wastewater detection occurred was 72.6% per day, and 61.9% per week.
17/01/2024	CIDRAP	News	Europe's mpox activity continues at low level	Mpox cases persist at a relatively low level in the European region, as reported by the ECDC and WHO European regional office. Over the past month, 138 cases have been documented across 11 countries, all sequenced samples belonged to clade 2. Spain, Portugal, the United Kingdom, and Germany remain the countries with the highest reported cases.

11/01/2024	Lancet Microbe	Comment	Human antibody responses to circulating monkeypox virus emphasise the need for the first mpox-specific vaccine	Although smallpox vaccines can provide substantial cross-protection against MPXV, studies assessing JYNNEOS (a live, non-replicating modified Ankara strain) immunogenicity have revealed low antibody neutralisation levels against MPXV, highlighting the variability in antigenic targets among poxviruses. In clinical reports, the effectiveness rate of JYNNEOS is in the range 36–86%, suggesting that a more efficient mpox-specific vaccine might be necessary. Some mpox proteins such as H3L, and A35R have been associated with robust antibody and B-cell responses in convalescent donors and, as a result, are considered potential targets for vaccine development.
10/01/2024	CIDRAP	News	Study shows safety of MVA-BN vaccine for mpox	A new study, published in <i>Vaccine</i> demonstrated the safety and tolerability of the smallpox MVA-BN vaccine, which provides protection against other orthopoxviruses. Two doses were administered to 1 173 participants at high risk of contracting mpox and few reported adverse effects were reported during a 8-month monitoring period. 60% of vaccinated experienced mild symptoms, such as localized injection-site pain, and no cases of severe neurological disease, skin conditions or myocarditis were documented.
03/01/2024	CIDRAP	News	2016 mpox outbreak in chimps at Cameroon sanctuary had 87% attack rate	A new study described a mpox outbreak occurring in a sanctuary housing approximately 300 captive chimpanzees, gorillas and monkeys. The outbreak affected 20 out of 23 adult and younger chimpanzees but showed no sign of propagation to other groups over the last six months. The most common signs included rash, lethargy and facial or peri-laryngeal swelling. The lethality rate stood at 10%, with two fatalities among the affected animals, while the remaining chimpanzees successfully recovered.
03/01/2024	JAMA	Medical News In Brief	More Virulent Mpx Clade Can Be Sexually Associated, WHO and CDC Warn	As of December 7, there were no reported cases of clade I mpox in the US, the Centers for Disease Control and Prevention (CDC) announced. Still, the CDC warned that clinicians need to be aware of the possibility of clade I mpox infection in their patients who have recently traveled to the DRC. Medications as well as vaccines to prevent infection are expected to be effective against both mpox subtypes.
22/12/2023	WHO	Report	Multi-country outbreak of mpox	The African region shows a relatively low case count of laboratory-confirmed cases. The section of the report focusing on the Democratic Republic of the Congo illustrates the high level of transmission occurring in the country as reflected by the high number of suspected (clinically compatible) cases reported.
15/12/2023	UN	News	L'épidémie de mpox s'étend en République démocratique du Congo, prévient l'OMS	The UN health agency recently carried out a mission to the DRC to assess the situation and support the national authorities in their response to the epidemic. WHO is collaborating with the Congolese Ministry of Health to support the distribution of sample collection and transport kits to referral hospitals from suspected cases in Kinshasa, South Kivu and other affected areas. At present, only 9% of mpox cases have been laboratory confirmed. It is also essential to close the gaps in access to vaccines and therapeutic products.
07/12/2023	CDC	Travel Notices	Level 2 - Practice Enhanced Precautions Mpox in the Democratic Republic of the Congo (DRC)	Travelers should: Avoid close contact with sick people, including those with skin lesions or genital lesions. Avoid contact with contaminated materials used by sick people (such as clothing, bedding, or materials used in healthcare settings) or that came into contact with infected animals. Avoid contact with dead or live wild animals, such as small mammals including rodents (rats, squirrels) and non-human primates (monkeys, apes). Avoid eating or preparing meat from wild game (bushmeat) or using products derived from wild animals from endemic countries throughout Central and West Africa (creams, lotions, powders).
07/12/2023	CDC	Health Alert Network	Mpox Caused by Human-to-Human Transmission of Monkeypox Virus with Geographic Spread in the Democratic Republic of the Congo	The Centers for Disease Control and Prevention (CDC) is issuing this Health Alert to notify clinicians and health departments about the occurrence, geographic spread, and sexually associated human-to-human transmission of Clade I MPXV in the DRC. Clinicians should be aware of the possibility of Clade I MPXV in travelers who have been in DRC and CDC recommends that clinicians encourage vaccination for patients who are eligible.

05/12/2023	ECDC	Threat Assessment Brief	Implications for the EU/EEA of the outbreak of mpox caused by Monkeypox virus clade I in the Democratic Republic of the Congo	Currently, there is no evidence that MPXV clade I is circulating outside certain central African countries and available MPXV sequences do not suggest circulation in the EU/EEA. The likelihood of infection from the ongoing epidemic mpox due to MPXV clade I is assessed as very low for the general EU population. The likelihood of infection with clade I virus for the population of men who have sex with men (MSM) with multiple sexual partners in the EU/EEA is considered higher than that of the general population.
05/12/2023	CIDRAP	News Brief	ECDC weighs in on wider risk from DRC mpox outbreak clade	The European Centre for Disease Prevention and Control (ECDC) said there's no evidence that clade 1 is spreading outside of central Africa. So far, genetic sequencing of viruses doesn't reflect any spread in EU/EEA. The current overall threat to the region is low. However, the risk from clade 1 infections is higher in MSM who have multiple sexual partners than for the general population.
30/11/2023	CIDRAP	News Brief	Details emerge on initial cases in latest DRC mpox outbreak	In March of 2023, a man from the DRC (case patient 1) in his late 20s reported having two sexual encounters with a man in Europe (suspected primary case) 1 week before returning to the DRC. The DRC man then reported having sexual contact with 9 more people, 6 men and 3 women. After case patient 1 developed penile lesions and fever and was seen in a health clinic, health officials contacted the 9 sexual contacts. Viral genome sequencing showed tight clustering among 3 PCR-positive samples, suggesting they belong to the same chain of transmission. The closest related sequence beyond this cluster was a 2022 clade 1 MPXV sequence from RDC. An additional 120 contacts from the initial cases were monitored and none of these contacts developed clinical symptoms of mpox over the 21-day monitoring period.
29/11/2023	Science	News	Amid Congo's deadliest mpox outbreak, a new worry: virus has become sexually transmissible	The WHO report and a study out today explore a worrisome possibility: that the strain of virus found in DRC, far deadlier than the one that drove the global outbreak, is in some cases spreading between sexual partners. Researchers are now rushing to analyze the latest DRC cases to see whether the local virus has changed genetically or whether the description pattern of transmission has been missing for the last decades, due to lack of resources to investigate. For the clade IIb virus that spread globally, genetic analyses showed that several mutations likely explained how it had changed to transmit more readily through sex. But there's no evidence yet that the viruses isolated from the DRC cases have undergone the same changes.
28/11/2023	CDC	Dispatch	Clade I-Associated Mpox Cases Associated with Sexual Contact, the Democratic Republic of the Congo	The authors report for the first time a cluster of clade I monkeypox virus infections linked to sexual contact in the Democratic Republic of the Congo (DRC). Case investigations resulted in 5 reverse transcription PCR-confirmed infections; genome sequencing suggest they belonged to the same transmission chain. This finding demonstrates that mpox transmission through sexual contact extends beyond clade IIb.
27/11/2023	CIDRAP	Special Edition	Mpox hits DR Congo hard as officials note sexual spread, 581 deaths	The outbreak likely began with a Belgian man who traveled to the DRC in March and tested positive for the disease shortly after arriving in the country. The man reported visiting several underground sex clubs for men who have sex with men (MSM) during his trip, even when he was symptomatic. A total of 27 contacts of the man were identified, and 6 were tested for mpox, with 5 sexual contacts testing positive. The initial cluster of cases is the first documented sexual transmission of mpox clade 1.
23/11/2023	WHO	News	Mpox (monkeypox)- Democratic Republic of the Congo	Before April 2023, no formally documented cases of sexual transmission of clade I MPXV were registered globally. The first known cases were reported when a man, resident in Belgium and with connections to the Democratic Republic of the Congo (DRC), tested positive for clade I in Kenge, Kwango province, during a visit to the DRC. Thereafter, sexual contacts of this case in the DRC also tested positive for clade I MPXV, with closely related viral sequences. This is the first time that reported clade I MPXV infection is linked to sexual transmission within a cluster. Another outbreak in the country is also being reported with multiple cases of mpox among sex workers.
16/11/2023	MSF	News	MSF responds to Mpox outbreak in Bolomba, DR Congo	From the end of August to mid-October 2023, an MSF emergency team was present in Equateur, a western province in Democratic Republic of Congo (DRC) highly affected by an outbreak of Mpox over the past months, to support the Ministry of Health in its response. The field humanitarians of MSF reinforced epidemiological monitoring at the community level and provided medical care in health centers as well as in the Bolomba general referral hospital, where an isolation circuit and a dedicated treatment unit were set up.

10/10/2023	NIAID	News	The STOMP trial evaluates an antiviral for mpox	The National Institute of Allergy and Infectious Diseases (NIAID) launched the STOMP trial to determine whether the antiviral drug tecovirimat can safely and effectively treat mpox. Tecovirimat was initially developed to treat smallpox—a species of virus closely related to mpox—but the drug’s safety and efficacy as an mpox treatment has not been established. The STOMP trial is a phase 3 study that aims to enroll about 500 people—a process that may require considerable time while mpox burden is low in study countries. NIAID continues to prioritize this study even while case counts are low.
19/07/2023	Nat Commun	Correspondence	Community-engaged Mpox vaccination provides lessons for equitable health care in the United States	These growing population-level sexual health challenges must be understood and resolved within the context of their inequitable impact, with Latino and Black communities experiencing more than half of all estimated new HIV infections, reported cases of sexually transmitted infection and teen births ^{1,2,3} . These sexual health inequities are emblematic of US healthcare and public health systems. The 2022 outbreak of Mpox in the United States is an informative example of continued inequities. Consistent with well-established inequitable patterns, the rate of MSM who successfully received the first dose of the two-dose Mpox vaccination series during May and June 2022, the first 2 months of the campaign, was 37% and 56% higher for white MSM than for Latino MSM and Black MSM, respectively. However, the national Mpox vaccination program responded to these equity challenges with some notable successes from which lessons could be drawn. To address this misalignment, the Mpox vaccination program increased collaboration with grassroots community stakeholders. It also adopted an innovative approach focused on deployment of decentralized, community-based and culturally and contextually aligned service-delivery models that meaningfully engaged community leaders in designing and implementing local vaccination campaigns. By August 2022, the first-dose vaccination rates for Latino and Black MSM were above those for white MSM.
12/05/2023	Nature	News	Scientists fear Mpox support will wane as emergency ends	The World Health Organization (WHO) announced on 11 May that mpox is no longer a public-health emergency of international concern – but researchers fear that the decision will draw crucial resources away from curbing the disease, which is still prevalent in regions including Africa.
14/02/2023	NIH	News	NIH scientists develop mouse model to study mpox virulence	Scientists from the National Institute of Allergy and Infectious Diseases (NIAID) have developed an inbred mouse model of mpox disease (CAST/EiJ) and used it to demonstrate clear differences in virulence among the major genetic groups (clades) of mpox virus (MPXV). As in people, clade I was the most virulent in CAST mice, followed by clade IIa, then clade IIb. Unexpectedly, clade IIb virus was 100 times less virulent than clade IIa virus in mice and led to very little viral replication and much lower virulence than either of the historic clades. No mice died of Clade IIb infection, despite exposure to extremely large doses of virus. Together, the results suggest that clade IIb is evolving diminished virulence or adapting to other species.
23/06/2022	Nature	News	Monkeypox in Africa: the science the world ignored	In recent weeks, the WHO has recognized the inequity in the global attention that monkeypox is receiving. After monkeypox cases exploded last year in countries where outbreaks don’t usually occur – a rapid, global response followed, including the distribution of vaccines in some non-endemic countries. But monkeypox outbreaks have been occurring in parts of Central and West Africa for years, leaving African researchers there disheartened that such resources have not been made available in their countries, where the disease’s toll has been highest. Member nations of the World Health Organization (WHO) have pledged more than 31 million smallpox-vaccine doses to the agency for smallpox emergencies – but these have never been distributed to Africa for use against monkeypox.

Mpox Outbreak in DRC 2023 - Scientific articles

The « Scientific articles » section presents relevant articles published on peer-reviewed scientific journals or pre-print platforms

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

This table provides a condensed summary of a more extensive content accessible in Excel format here.

Date	Source	Type of publication	Title	Key facts
08/05/2024	Analytica Chimica Acta	Research article	A rapid and sensitive fluorescent chromatography with cloud system for MPXV point-of-care diagnosis	In this study, a rapid and sensitive fluorescent chromatography assisted with cloud system was developed for point-of-care diagnosis of mpox. To screen high affinity antibodies, nanoparticle antigen AaLS-A29 was generated by conjugating A29 onto scaffold AaLS. Monoclonal antibodies (mAb) were generated with the immunized mice, and the mAb MXV 14 and MXV 15, were selected for fluorescence chromatography development. After optimization of the label and concentration of antibodies, a sensitive Time-Resolved Fluorescence Immunoassay (TRFIA) assay with detection limit of 20 pg/mL and good repeatability was developed. The detection of the surrogate Vaccinia virus (VACA) strain Tian Tan showed that the TRFIA assay was more sensitive than the SYBR green I based quantitative PCR. In real samples, the detection result of this assay were highly consistent with the judgement of qRT-PCR (Concordance Rate = 90.48%) as well as the clinical diagnosis (Kappa Value = 0.844, P < 0.001). By combining the portable detection and online cloud system, the detection results could be uploaded and shared, making this system ideal for point-of-care diagnosis of mpox both in field laboratory and outbreak investigation.
30/04/2024	Emerging Infectious Diseases	Research article	Health Belief Model to Assess Mpox Knowledge, Attitudes, and Practices among Residents and Staff, Cook County Jail, Illinois, USA, July-August 2022	In summer 2022, a case of mpox was confirmed in a resident at the Cook County Jail (CCJ) in Chicago, Illinois, USA. Some in-depth interviews were conducted with CCJ residents and staff to assess mpox knowledge, attitudes, and practices; hygiene and cleaning practices; and risk behaviors. CCJ residents and staff perceived increased mpox susceptibility but were unsure about infection severity; they were motivated to protect themselves but reported limited mpox knowledge as a barrier and desired clear communication to inform preventive actions. Residents expressed low self-efficacy to protect themselves because of contextual factors (limited access to cleaning, disinfecting, and hygiene items, etc.). These findings suggest correctional facilities can support disease prevention by providing actionable and tailored messages; educating residents and staff about risk and vaccination options; and ensuring access to and training for hygiene, cleaning, and disinfecting supplies.
30/04/2024	Viruses	Research article	Fast and Ultrasensitive Detection of Monkeypox by a Pyrococcus furiosus Argonaute System Coupled with a Short Amplification	This study describes an innovative detection system for mpox, targeting the MPXV specific F3L gene, based on Pyrococcus furiosus Argonaute (PfAgo), an artificial DNA-guided restriction cleavage enzyme programmable with 5'-phosphorylated ssDNA sequences. A short amplicon of 79 bp could be obtained through a fast PCR procedure. Two 5'-phosphorylation guide DNAs were designed to guide PfAgo to cleave the amplicon to obtain an 18 bp 5'-phosphorylation sequence specific to MPXV, not to other orthopoxviruses. The 18 bp sequence guided PfAgo to cleave a designed probe specific to MPXV to emit fluorescence. With optimized conditions for the PfAgo-MPXV system, it could be completed in 60 min for the detection of the extracted MPXV DNA with the limit of detection (LOD) of 1.1 copies/reaction and did not depend on expensive instruments. Successful application of the PfAgo-MPXV system in sensitively detecting MPXV in simulated throat swabs, skin swabs, sera, and wastewater demonstrated the system's good performance, high sensitivity and specificity.

30/04/2024	Emerging Infectious Diseases	Research article	Health Belief Model to Assess Mpox Knowledge, Attitudes, and Practices among Residents and Staff, Cook County Jail, Illinois, USA, July-August 2022	In summer 2022, a case of mpox was confirmed in a resident at the Cook County Jail (CCJ) in Chicago, Illinois, USA. Some in-depth interviews were conducted with CCJ residents and staff to assess mpox knowledge, attitudes, and practices; hygiene and cleaning practices; and risk behaviors. CCJ residents and staff perceived increased mpox susceptibility but were unsure about infection severity; they were motivated to protect themselves but reported limited mpox knowledge as a barrier and desired clear communication to inform preventive actions. Residents expressed low self-efficacy to protect themselves because of contextual factors (limited access to cleaning, disinfecting, and hygiene items, etc.). These findings suggest correctional facilities can support disease prevention by providing actionable and tailored messages; educating residents and staff about risk and vaccination options; and ensuring access to and training for hygiene, cleaning, and disinfecting supplies.
29/04/2024	Eurosurveillance	Research article	Multiple introductions of monkeypox virus to Ireland during the international mpox outbreak, May 2022 to October 2023	This article aim to elucidate the origins and molecular characteristics of MPXV circulating in Ireland between May 2022 and October 2023. Whole genome sequencing of MPXV from 75% of all Irish mpox cases (182/242) was performed and compared to sequences retrieved from public databases (n=3,362). All 182 analysed genomes were assigned to Clade IIb and, presence of 12 distinguishable subclades suggests multiple introductions into Ireland. 92% of nucleotide mutations were from cytosine to thymine (or from guanine to adenine), leading to a high number of non-synonymous mutations across subclades. The detailed viral phylogenetic analysis provides evidence for multiple introductions of the virus into Ireland, and underscores the potential for future importation events. These findings also highlight the need for ongoing vigilance (especially surveillance of viral genetic) as MPXV continues to circulate internationally.
22/04/2024	J Med Virol	Research article	Pan-microscopic examination of monkeypox virus in trophoblasts cells reveals new insights into virions release through filopodia-like projections	In the present study, the authors identify trophoblasts as a target cell for MPXV replication. In a pan-microscopy approach, they decipher the specific infectious cycle of MPXV and inner cellular structures in trophoblasts. They identified the formation of a specialized region for viral morphogenesis and replication in placental cells. In addition, the authors reported infection-induced cellular remodeling suggesting that MPXV stimulates cytoskeleton reorganization with intercellular extensions for MPXV cell spreading specifically to trophoblastic cells. Altogether, the specific infectious cycle of MPXV in trophoblast cells and these protrusions that were structurally and morphologically similar to filopodia reveal new insights into the infection of MPXV.
19/04/2024	J Clin Microbiol	Research article	Multi-center evaluation of the Research Use Only NeuMoDx monkeypox virus (MPXV) fully automated real-time PCR assay	This study details the evaluation of the Research Use Only (RUO) NeuMoDx MPXV assay, designed and developed by Qiagen for the NeuMoDx Molecular Systems. Primers and probes were tested for specificity and inclusivity in silico. A total of 296 clinical samples were tested by three sites in the US and Europe. The analytical sensitivity of the assay, determined by testing dilutions of synthetic and genomic MPXV DNA, was 50 copies/mL for both clades I and II. The assay showed 100% in silico identity for 80 clade I and 99.98% for 5,162 clade II genomes. Clade II primers and probes showed 100% in silico specificity; however, identity of at least one of the two sets of clade I primers and probes with variola, cowpox, camelpox, and vaccinia viruses was noticed. The clinical validation showed sensitivity of 99.21% (95% CI: 95.66–99.98%) and specificity of 96.64% (95% CI: 91.62–99.08%) for lesion swab samples. The NeuMoDx MPXV Test shows acceptable analytical and clinical performance. The Test Strip can differentiate clades I and II.

18/04/2024	Nat Commun	Research article	Monkeypox virus genomic accordion strategies	In this study, the authors determine a high-quality MPXV genome sequence with low-complexity regions (LCRs) using a combination of highly sensitive techniques. This reveals significant variation in short tandem repeats within LCRs. They demonstrate that LCR entropy in the MPXV genome is significantly higher than that of single-nucleotide polymorphisms (SNPs) and that LCRs are not randomly distributed. In silico analyses indicate that expression, translation, stability, or function of MPXV orthologous poxvirus genes (OPGs), including OPG153, OPG204, and OPG208, could be affected in a manner consistent with the established "genomic accordion" evolutionary strategies of orthopoxviruses.
16/04/2024	Nat Commun	Research article	Synergistic effect of two human-like monoclonal antibodies confers protection against orthopoxvirus infection	This study describes two recently developed human-like monoclonal antibodies (mAbs) from vaccinia virus-immunized non-human primates. MV33 and EV42, targeting the two infectious forms of the virus, were selected for in vivo evaluation, based on their in vitro neutralization potency. A single dose of either MV33 or EV42 administered 3 days post-infection (dpi) to BALB/c female mice provides full protection against lethal ectromelia virus challenge. Importantly, a combination of both mAbs confers full protection even when provided 5 dpi. Whole-body bioimaging and viral load analysis reveal that combination of the two mAbs allows for faster and more efficient clearance of the virus from target organs compared to either MV33 or EV42 separately. The combined mAbs treatment further confers post-exposure protection against the currently circulating Mpox virus in Cast/EiJ female mice, highlighting their therapeutic potential against other orthopoxviruses.
16/04/2024	Nat Commun	Research article	Ultrasensitive single-step CRISPR detection of monkeypox virus in minutes with a vest-pocket diagnostic device	This study describes the development of a single-step CRISPR-based diagnostic platform (SCOPE, Streamlined CRISPR On Pod Evaluation platform), for field-deployable ultrasensitive detection of MPXV in resource-limited settings. The viral nucleic acids are rapidly released (2 min) from the rash fluid swab, oral swab, saliva, and urine samples via a streamlined viral lysis protocol, followed by a 10-min single-step recombinase polymerase amplification (RPA)-CRISPR/Cas13a reaction. A pod-shaped vest-pocket analysis device achieves the whole process for reaction execution, signal acquisition, and result interpretation. SCOPE can detect as low as 0.5 copies/ μ L (2.5 copies/reaction) of MPXV within 15 min. The assay was validated on 102 clinical samples from male patients / volunteers, and the results were 100% concordant with the real-time PCR. SCOPE achieves a single-molecular level sensitivity in minutes with a simplified procedure performed on a miniaturized wireless device, adapted to point-of-care settings.
16/04/2024	Biosens Bioelectron	Research article	A rapid and sensitive one-pot platform integrating fluorogenic RNA aptamers and CRISPR-Cas13a for visual detection of monkeypox virus	In this study, the authors propose a comprehensive strategy integrating RNA aptamer, recombinase-aided amplification (RAA), and CRISPR-Cas13a systems for the molecular detection of MPXV target. They utilized a cost-effective and stable fluorogenic RNA aptamer (Mango III), specifically binding and illuminating the fluorophore TO3-3 PEG-Biotin Fluorophore (TO3), as a reporter for Cas13a trans-cleavage activity. Leveraging the inherent collateral cleavage properties of the Cas13a system, they established high-sensitivity and specificity assays to distinguish MPXV from other Orthopoxviruses. A streamlined one-pot protocol was developed to mitigate aerosol contamination risks. The aptamer-coupled RAA-Cas13a one-pot detection method achieved a Limit of Detection (LoD) of 4 copies of target MPXV DNA in just 40 min. Validation using clinical MPX specimens confirmed the rapid and reliable application of our RAA-Cas13a-Apt assays without nucleic acid purification procedure, highlighting its potential as a point-of-care testing solution.

15/04/2024	BMC Infectious Diseases	Research article	The global patent landscape of emerging infectious disease monkeypox	In this paper, the mpox-related patents from 1989 to 2022 is reviewed, generating patent landscapes and mining. It includes the temporal trend, geographical distribution, partnership of patentees, patent transfer, influencing factors of patent citations and key points of patented technology. The most mpox-related patent inventors are by far in the US, followed by France, while in LMICs they are highly under-represented. American companies and universities, including SIGA Technologies and Chimerix, dominate the patent cooperation network, but the academic community has been more and more present. Drugs have attracted much attention, but studies of vaccine and virus testing lack sufficient patent support. Among treatments, the number of biological drugs and chemical drugs ranked at the top. The temporal trend shows that patent activity has followed the rapidly increasing trend of the mpox virus epidemic.
15/04/2024	BMC Infectious Diseases	Research article	The 5 C model and Mpox vaccination behavior in Germany: a cross-sectional survey	During the 2022 Mpox outbreak, a cross-sectional online survey on Mpox was conducted in Germany in August, on risk factors, vaccination and treatment status. The survey were shared through snowball sampling with organizations that focus LGBTQIA persons. The survey included a long 5 C scale, consisting of 15 items in the five categories : confidence, complacency, constraints, calculation, and collective responsibility. The analyses were made among 3,250 participants who responded to the survey. Confidence and collective responsibility were positively associated with intention to get vaccinated, while complacency was negatively correlated. Fewer perceived constraints were associated with higher odds to be vaccinated. Future vaccination campaigns against Mpox should focus on decreasing barriers, for example by making the vaccines widely available in primary care institutions.
15/04/2024	medRxiv	Pre-print	Sustained Human Outbreak of a New MPXV Clade I Lineage in Eastern Democratic Republic of the Congo	An outbreak in Kamituga province (South Kivu, Democratic Republic of the Congo), involving 241 suspected mpox cases was investigated by the National Institute of Biomedical Research (Kinshasa). Out of 119 hospitalized individuals from October 2023 to January 2024, 90.8% tested positive for MPXV, with 85% exhibiting genital lesions. Notably, 28.7% of confirmed cases were among professional sex workers, suggesting sexual contact as a significant mode of transmission, unlike previous outbreaks predominantly affecting children in the DRC. Genomic analysis of 22 MPXV-positive samples revealed a distinct lineage (clade Ib) unique to Kamituga, marked by APOBEC3-type mutations associated with efficient human-to-human transmission. The presence of APOBEC3-type mutations was substantially lower (15.3%) in samples from outside Kamituga province, suggesting limited spread beyond the region. Polymorphisms identified within sequences isolated from earlier zoonotic mpox cases (2011-2012) suggest that this lineage likely originated from a local, non-human animal reservoir. These findings indicate that the majority of cases likely stem from multiple independent spillover events from reservoir hosts. There is a need for further investigation to understand the underlying factors driving these events and the surge observed in Kamituga.
11/04/2024	PLoS One	Research article	Deployment of the National Notifiable Diseases Surveillance System during the 2022–23 mpox outbreak in the United States—Opportunities and challenges with case notifications during public health emergencies	Current public health informatics infrastructure lacks the flexibility and scalability needed to meet the informational needs following the introduction of a novel disease or a rapidly evolving outbreak of a non-notifiable disease. To help address these limitations, CDC (US) launched the Data Modernization Initiative (DMI) in 2020 to protect the US population from any health threat, including the introduction of a novel or re-emerging pathogen such as mpox. Based on the experience of the 2022 Mpox outbreak, and the interim approaches that were established to capture case data, this article summarize lessons learned for future outbreaks.

06/04/2024	Clin Microbiol Infect	Research article	History of smallpox vaccination and marked clinical expression of mpox among cases notified in France, from May to July 2022	Based on the registration in France of 1,888 confirmed mpox cases with date of symptom onset between 7 May and 31 July 2022, this article aim to estimate the effect of reported history of smallpox vaccination prior to 1980 on clinical expression of mpox. Among cases who provided information about their vaccination status, 14% reported smallpox vaccination prior to 1980. The proportion of cases with marked symptoms was 2% among those reporting vaccination prior to 1980 and 8% among those who reported no vaccination. There was no evidence of an effect of smallpox vaccination on development of complications or hospitalisation due to mpox.
05/04/2024	J Infect Public Health	Research article	Age-related antibody response to Orthopoxviruses and implications for public health measures: Insights from a South Korean study	This study aimed to determine the overall level of mpox and smallpox immunity in Koreans across different age group, using enzyme-linked immunosorbent assays (ELISA). Plasma samples from 56 participants ranging from 20 to over 90 years of age were analyzed. Koreans born before 1979 had higher levels of antibodies in response to smallpox and mpox antigens, than unexposed individuals, demonstrating a long-term immune memory for smallpox infection. There was also a strong positive correlation between antibody concentration, and reactivity to various OPXVs. The results showed no difference in smallpox and MPOX antibody levels according to sex. These findings underline the need for proactive measures to protect people under the age of 40, who are at greater risk of infection and have weakened immune defenses.
04/04/2024	J Infect Public Health	Research article	Breakthrough cases of mpox: One-dose vaccination is associated with milder clinical manifestations	This study aimed at investigating the effectiveness of MVA-BN vaccination in decreasing the severity of mpox clinical signs. Questionnaires were distributed to 403 individuals who had contracted mpox in Montreal, Canada. Among them, 55 individuals (representing 39% of the total) had received a single dose of MVA-BN vaccine at least 14 days before the onset of symptoms. The study revealed that vaccinated individuals exhibited fewer lesions, and less distributed across the body. HIV-positive individuals reported a significantly higher number of lesions compared to HIV-negative individuals, yet vaccination demonstrated a consistent reduction in the risk of all outcomes regardless of HIV status. Consequently, the authors estimated that a single dose of MVA-BN vaccine was approximately 60% effective in reducing the frequency and extent of clinical manifestations, suggesting its potential utility beyond mere prevention of infection.
04/04/2024	Emerging Microbes and Infections	Research article	Evaluation of Analytical Performance of the STANDARDTM M10 MPX/OPX Assay for the Simultaneous DNA Detection and Clade Attribution of Monkeypox virus	The present study evaluated the performance of the new M10 MPX/OPX assay, a single-test cartridge that combines nucleic acids extraction, amplification, and detection of genomic targets: results were compared to the laboratory RT-PCR for Orthopoxvirus infection diagnosis, showing high concordance, PPA and NPA. The M10 OPX/MPX assay demonstrated its reliability in detecting MPXV infection, with high analytical sensitivity and in different biological matrixes, also allowing a rapid clade identification. Moreover, the rapid processing, the Point-of-Care approach and being highly user friendly make the platform an interesting means of testing for expanded diagnostic networks, in which resources and expertise might greatly differ across different laboratories.
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03/04/2024	Clinical Infectious Diseases	Research article	Investigation of an mpox outbreak affecting many vaccinated persons in Chicago, IL—March 2023–June 2023	The authors investigated an mpox outbreak affecting vaccinated persons in Chicago in 2023. They interviewed patients and reviewed medical records to assess demographic, behavioral, and clinical characteristics, mpox vaccine status, and vaccine administration routes. They evaluated serum antibody levels after infection and compared patient viral genomes with MPXV sequences in available databases. In summary, they showed that the 49 mpox cases identified were likely due to frequent behaviors associated with mpox transmission, even with relatively high vaccine effectiveness and vaccine coverage.
03/04/2024	Clinical Infectious Diseases	Research article	Investigation of an mpox outbreak affecting many vaccinated persons in Chicago, IL—March 2023–June 2023	The authors investigated an mpox outbreak affecting vaccinated persons in Chicago in 2023. They interviewed patients and reviewed medical records to assess demographic, behavioral, and clinical characteristics, mpox vaccine status, and vaccine administration routes. They evaluated serum antibody levels after infection and compared patient viral genomes with MPXV sequences in available databases. In summary, they showed that the 49 mpox cases identified were likely due to frequent behaviors associated with mpox transmission, even with relatively high vaccine effectiveness and vaccine coverage.
02/04/2024	Structure	Research article	Structural basis for the inhibition mechanism of the DNA polymerase holoenzyme from mpox virus	The core of the mpox virus (MPXV) DNA polymerase holoenzyme comprises three essential components: DNA polymerase F8, processivity factors A22, and Uracil-DNA glycosylase E4. This holoenzyme is a critical antiviral target. Nucleotide analogs like cidofovir and cytarabine (Ara-C) have demonstrated efficacy in suppressing MPXV replication and show promise against other poxviruses. In this study, the authors present the cryo-EM structure of the DNA polymerase holoenzyme F8/A22/E4 bound with its competitive inhibitor Ara-C-derived cytarabine triphosphate (Ara-CTP) at a resolution of 3.0 Å, revealing its inhibition mechanism. Ara-CTP acts as a direct chain terminator near the deoxycytidine triphosphate (dCTP)-binding site, forming an additional hydrogen bond with Asn665 that enhances its binding affinity compared to dCTP.
01/04/2024	Virology	Brief Communication	Monkeypox: Can we count on the current smallpox immunization?	In this study, the authors performed a comprehensive comparison of antigens between the 2022–2023 monkeypox strains and the smallpox vaccine strains. The analysis revealed considerable amino acid changes in all 27 antigens, including core and envelope proteins. Amino acid substitutions within B cell epitopes were observed in 26 of these antigens, with at least half of the antigen substitutions occurring within B cell epitopes in 20 out of the 26 antigens analyzed. These findings indicate substantial antigenic changes in the outbreak strains, especially in the B cell epitopes, compared to the vaccine strains. Thus, it is crucial to pay attention to the efficacy of current smallpox vaccines in preventing monkeypox.
01/04/2024	J Clin Virol	Research article	Performance of the Xpert™ Mpx PCR assay with oropharyngeal, anorectal, and cutaneous lesion swab specimens	The authors developed the Cepheid Xpert® Mpx, the first point-of-care assay to receive FDA emergency use authorization in the United States, and a potentially valuable tool for evaluating anorectal and oropharyngeal (in addition to skin) sample. This exploratory study demonstrates 100 % positive agreement with the in-house PCR assay for natural positive anorectal and oropharyngeal specimens and 92 % sensitivity with low-positive spiked specimens. Furthermore, the Xpert® assay detected viral DNA in specimens not detected by the reference PCR assay from four participants with mpox DNA at other sites, suggesting it may be more sensitive at low viral loads. Validation of the Xpert® for oropharyngeal and anorectal sample types can be rapidly achieved if prospective samples become available.

29/03/2024	Travel Med Infect Dis	Research article	Dynamics of viral DNA shedding and culture viral DNA positivity in different clinical samples collected during the 2022 mpox outbreak in Lombardy, Italy	The study describes the clinical and virological data collected during the monitoring of 353 MPXV-positive subjects in the Lombardy region (Italy). The results confirm that viral DNA detected by qPCR on lesions swabs is the most appropriate standard tool for rapid MPXV laboratory diagnosis. In addition, the results suggest that MPXV DNA detection was more frequent in the skin (94.4%) and a higher isolation rate in semen, urine, anogenital, urethral and skin samples, taken within 7 days of the onset of symptoms. The persistence of MPXV DNA in the upper respiratory tract that was not associated with a viable virus.
28/03/2024	Sci Rep	Meta-analysis	Dynamics of Mpox infection in Nigeria: a systematic review and meta-analysis	This study of available evidence on Mpox in Nigeria is based on a systematic review and meta-analysis. The findings showed a progressive spread from the southern to the northern region of the country. The following factors were identified as important in the transmission of Mpox in Nigeria; poverty, lack of basic healthcare facilities, and risk of exposure through unsafe sexual practices. Establish robust multi-sectoral collaboration to understand the dynamics of Mpox Nigeria is needed.
27/03/2024	Signal Transduct Target Ther	Research article	Rapid development of double-hit mRNA antibody cocktail against orthopoxviruses	In this study, the authors constructed four lipid nanoparticle (LNP)-encapsulated mRNA combinations that encode monoclonal antibodies with broad neutralization activities against orthopoxviruses. In vivo characterization demonstrated that a single intravenous injection of each LNP-encapsulated mRNA antibody in mice resulted in the rapid production of neutralizing antibodies. mRNA antibody treatments showed significant protection from weight loss and mortality in the vaccinia virus (VACV) lethal challenge mouse model, and a unique mRNA antibody cocktail, Mix2a, exhibited superior in vivo protection by targeting both intracellular mature virus (IMV)-form and extracellular enveloped virus (EEV)-form viruses. This proof-of-concept study highlights the potential of tailored mRNA antibody combinations as a universal strategy to combat orthopoxvirus as well as other emerging viruses.
27/03/2024	Sci Transl Med	Research article	Comparison of the immunogenicity and protective efficacy of ACAM2000, MVA, and vectored subunit vaccines for Mpox in rhesus macaques	In this study, the authors performed a head-to-head comparison of four different poxvirus vaccines: ACAM2000, JYNNEOS, and two adenovirus 35-vectored subunit vaccines encoding two or four vaccinia virus antigens. The authors vaccinated nonhuman primates, including with two different routes for the JYNNEOS vaccine, as used in human vaccination campaigns, and assessed vaccine protection against a subsequent intravenous challenge with mpox virus. All vaccines and routes elicited immune responses and conferred at least partial protection against infection. Differences between the vaccines allowed the authors to interrogate correlates of protection, which included neutralizing antibody titers and immune responses specific to the L1R and B5R proteins of mpox virus.