

# Mpox Virus: Clade I and Clade II



## Summary

The mpox virus is classified into 2 main clades, clade I and clade II, with each further subdivided into clade Ia, the [newly identified clade Ib](#), clade IIa, and clade IIb, the clade which was responsible for the 2022 global outbreak. Since the 2022 clade IIb [mpox outbreak began](#), there have [more than 99,000 cases](#) and more than 200 deaths reported globally, though reported data likely do not include the most recent outbreaks of clade I in the Africa region. According to the US Centers for Disease Control and Prevention (US CDC), the [US has reported](#) 33,435 mpox cases and 60 deaths as of August 6, 2024, accounting for approximately one-third of all reported cases and deaths worldwide. The US outbreak has continued to grow at a low but steady pace in 2024, with [1,700 new cases](#) recorded year to date as of August 10, 2024. With the continued transmission of clade IIb in the US and globally and the increased transmission of clade I and II in the Africa region, experts are concerned that changes in the national and global landscape have the potential to increase health risks for specific US populations.

## Key Updates

### Global Response

- On August 14, 2024 the World Health Organization (WHO) [declared the current outbreaks](#) of multiple clades of mpox in the Democratic Republic of Congo (DRC), and nearby countries in Africa, to be a [Public Health Emergency of International Concern \(PHEIC\)](#). WHO also:
  - Elevated the global mpox outbreak to an acute Grade 3 emergency in accordance with the WHO Emergency Response Framework and issued guidance to WHO Member States.
  - Released funds from its Contingency Fund for Emergencies (CFE), developed a US\$15 million regional response plan, and authorized an additional US\$1 million of emergency funding to boost response efforts.
  - Extended for an additional year the WHO Director General's [Standing Recommendations for mpox](#) first issued on August 21, 2023.
  - Began the process for Emergency Use Listing for 2 mpox vaccines to ease access and distribution processes, including distribution aid from GAVI and UNICEF.
- The Africa Centres for Disease Control and Prevention (Africa CDC) also declared this to be a [Public Health Emergency of Continental Security \(PHECS\)](#), signaling the increased threat of international spread posed by this virus. A large driver of these declarations is the spread of clade Ib.
- CDC issued a [Health Alert Network notice \(HAN\)](#) on August 7, 2024, the first CDC health advisory on mpox since December 2023. Details include expanded guidance for clinical

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examination, treatment and prevention, state and local health departments, laboratories, and the general public.

- [USAID announced](#) on August 7, 2024, that the agency will donate 50,000 Bavarian Nordic mpox vaccines to the DRC and US\$10 million in health assistance for critical public health interventions in response to the mpox outbreak in DRC and the region.

## Both Clades

- There are multiple new and ongoing outbreaks of mpox clades Ia, Ib, and Iib across Central and West Africa. [As of August 16, 2024](#), a total of 18,737 cases (3,101 confirmed; 15,636 suspected) and 541 deaths (case fatality ratio [CFR] of 2.89%) were reported from 10 African Union Member States. This represents a [160% and 19% increase in the number of cases and deaths](#), respectively, in 2024 compared to the same period in 2023; DRC accounts for about 98% of cases and deaths.

## Clade Iib

- South Africa has been experiencing a clade Iib mpox outbreak since May 2024. As of August 4, 2024, the [South Africa Department of Health reports 24 cases and 3 deaths](#). At least 5 of the cases have been [confirmed to be clade Iib](#). Most of these cases have been reported in men with HIV and many required hospitalizations. Evidence suggests that mpox likely is circulating in the community and has reached the most susceptible individuals, leading to a CFR of 12.5%, much higher than the clade Iib mpox global CFR, which was 0.2% overall as at the end of May 2024.
- On August 19, 2024, the [Philippines detected](#) a case of mpox in an individual with no recent travel history, the first case since December 2023. [On August 20, 2024](#) the Health Secretary announced 10 cases, all of which are clade II

## Clade I

- [Sweden reports](#) its first case of clade I mpox, detected in an individual who has recently traveled to areas with cases of mpox in Africa.
- [Pakistan reports](#) its first case of mpox (clade I, no subclade specified) in an individual who had recently traveled to the Middle East.
- [Thailand reports](#) its first suspected case of clade I (not yet confirmed) in an individual who had recently traveled from the Africa region.
- [Increases in cases continue](#) to be documented in Burundi, Central African Republic (CAR), Rwanda, while Cameroon, Congo, Ghana, and Liberia have not detected more cases since that last situation update was released.
- The DRC has been experiencing an mpox outbreak since 2022, but this year has brought the [largest surge in clade I mpox cases ever recorded](#) in the country. Since the beginning of the year up to [August 16, 2024](#), the country has recorded more than 17,794 confirmed or suspected cases, with 535 deaths.

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- Notably, 4.3%–5.7% of all suspected and confirmed clade I cases in DRC reported from January 1, 2023, to April 14, 2024, have been fatal. Additionally, 67% of all cases and 78% of deaths have [occurred among children aged 15 years and younger](#).
- The [likelihood that cases of clade I](#) will be imported to the US has increased in recent weeks as cases have begun to be detected in countries outside of the Africa region.

For more information about specific mpox scenarios and health risks, see the [CORI Mpox Resource Page](#).

## Background

The monkeypox (mpox) virus—a serious viral zoonosis endemic in west and central Africa—is classified into 2 main clades, clade I and clade II, with each further subdivided into clade Ia, the [newly identified clade Ib](#), clade IIa, and clade IIb. Clade I mpox is generally associated with higher CFRs (1.4% to ~10%) compared with clade II (0.1% to 3.6%).

In 2022, the epidemiology of clade IIb mpox shifted dramatically. The virus, which is historically transmitted through close contact with infected wildlife or infected persons, found a foothold in the sexual networks of gay, bisexual, and other men who have sex with men, including in the United States and Europe. Although the clade IIb virus is capable of transmission via respiratory droplets, short-range aerosols, or contact with contaminated objects (fomite transmission), the [majority of cases from the global epidemic were acquired through close, extended physical contact](#), particularly intimate or sexual contact.

The change in epidemiology and rapid spread of the virus in 2022 required urgent public health action, and WHO declared the outbreak a public health emergency of international concern (PHEIC) on July 23, 2022. Public health officials and community-based organizations in the US and worldwide [mounted a response](#) that included health education, awareness raising, testing, treatment, and vaccination with a vaccine that was originally designed to protect against smallpox but is also effective against mpox. By late summer, the public health response began to slow transmission. Vaccination campaigns and targeted interventions significantly reduced the number of new weekly cases. However, [cases continue to occur among individuals at increased risk of infection](#), particularly those who have not been vaccinated or have received only 1 dose of the 2-dose vaccine.

In 2024, the DRC has experienced an unprecedented number of clade I mpox cases, with transboundary cases occurring in several neighboring countries. Additionally, a [new offshoot of clade I has emerged](#), called clade Ib, that may be causing more severe disease. Before April 2023, [there were no formally documented cases of sexual transmission of clade I mpox](#), but many clusters of sexual transmission have since been recorded in the DRC. This new mode of sexual

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transmission, as well as other possible modes of transmission, and newly or more severely affected groups such as heterosexual sex workers and children, raise additional concerns over the continuing rapid expansion of the DRC outbreak.

## Key Public Health Recommendations

To minimize the health impact of mpox in the US, [CDC](#) and WHO recommend the following for clinicians and health departments:

- Implement prevention strategies:
  - Recommend all [adults at an elevated risk of infection](#) and those planning travel to affected countries [receive 2 doses of JYNNEOS](#) vaccine administered 28 days apart.
  - Mass gathering [event planning and preparedness activities](#) should foster community-based actions aimed at spreading precise and practical public health advice with a nondiscriminatory approach, utilizing different media and incorporate educational and awareness-raising initiatives related to mpox and other diseases of concern.
- Consider mpox as a potential diagnosis:
  - In patients with consistent symptoms and epidemiological risk factors, including those with recent travel to DRC or neighboring countries or contact with symptomatic individuals from affected areas.
  - In vaccinated individuals or those previously diagnosed with mpox.
- Implement proper infection control and patient management:
  - Follow CDC guidance on infection prevention and control to minimize transmission risk.
  - Advise suspected cases to isolate from others and counsel on preventing household transmission through disinfection practices.
  - Consult health departments or CDC for severe cases, especially those with advanced HIV.
- Ensure thorough laboratory testing:
  - Evaluate all suspected cases with laboratory testing, not only clinical diagnosis.
  - Follow specimen collection guidelines and send specimens to appropriate state or commercial laboratories.

## Available Medical Countermeasures

While clades I and II mpox viruses are genetically similar enough that [vaccines and treatments are expected to be effective](#), it is [not well understood](#) how prior infection with clade IIb (responsible for the ongoing global outbreak) or vaccination might protect from infection with

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or complications from clade I. [CDC recommends](#) that all individuals with an elevated risk of infection receive 2 doses of JYNNEOS vaccine for the best protection against both clades I and II.

The DRC National Regulatory Authority [recently authorized](#) 2 vaccines for emergency use, MVA-BN (brand name JYNNEOS in the US) and LC16 (Japan). As part of its standing recommendations, [WHO advises](#) countries to make vaccines available to nations in need. The US government recently announced a donation of 50,000 mpox vaccine doses to DRC.

As of August 9, 2024, [Nigeria is the only](#) other country in Africa that has authorized the use of any mpox vaccine.

In March 2024, the US Food and Drug Administration (FDA) issued Emergency Use Authorizations (EUAs) for an [in vitro mpox diagnostic device](#) and an [mpox home test collection kit](#).

## Current Outbreak Country Profiles

### *United States (Clade IIb Outbreak)*

To date, [all mpox cases reported within the US are of the clade IIb subtype](#). Since 2022, the [US outbreak](#) has grown to more than 33,435 cases and 60 deaths. The recorded number of mpox cases was relatively stable in the US from July 2023 to January 2024, with few ongoing sporadic cases and clusters. In 2024, outbreaks of clade IIb mpox remain a concern in the US, especially as summer festivals, increased travel, celebrations, and other events that bring people together from around the world occur. High levels of immunity from prior infections and vaccination help mitigate the risk of large outbreaks. Individuals at highest risk for clade IIb infection are gay, bisexual, and other men who have sex with men; people with multiple sexual partners; sex workers; and healthcare workers caring for infected patients.

### *Democratic Republic of the Congo (Clade I Outbreak)*

The [DRC government declared a national epidemic](#) in December 2022 for what is the largest surge in mpox cases ever recorded in the country. Since the beginning of this year and as August 16, 2024, [Africa CDC has reported](#) 16,794 confirmed or suspected cases of clade I mpox and 535 deaths in DRC, for a CFR of 3.18%. Based on the extent of the DRC outbreak, in combination with the demographic characteristics and the genetic diversity of cases, [experts suspect that multiple transmission factors](#) are driving the outbreak, including zoonotic, household, and sexual.

The current DRC clade I outbreak is widespread, affecting 25 of the country's 26 provinces, including the capital city of Kinshasa. The highest transmission rates have been in Equateur and Sud-Kivu. The province of Equateur remains the epicenter, contributing more than

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half of the country's suspected cases and three-quarters of deaths in 2024 alone. The clade I outbreak has mostly affected children, with 66% of cases and 82% of deaths among individuals ages 15 and younger. Experts believe this is likely because younger children were never vaccinated against the related smallpox virus; vaccination was discontinued shortly after smallpox was eradicated in 1980. Many children in the region also suffer from malnutrition, making it more difficult for their bodies to fight infection.

Notably, a new more dangerous strain of clade I mpox virus was documented in June 2024 in Sud-Kivu, described as an outbreak having pandemic potential that warrants urgent public health and case management support and targeted vaccination. However, vaccines are so far unavailable in the DRC, although their distribution and use has been authorized. According to experts, the clade Ib infections in DRC are being transmitted through sexual contact, particularly among sex workers and their contacts, as well as household and direct contact, and presenting with whole body or genital lesions that last longer than clade Iib symptoms. The more severe cases have a mortality rate near 5% in adults and 10% in children and have been associated with pregnancy loss.

Other cases and clusters of mpox have been reported by the Africa CDC in July and August 2024, including:

## *Burundi (Clade Ib Outbreak)*

On July 25, 2024, the Burundi Ministry of Health and [Africa CDC](#) reported the first-ever cases of mpox in the country, with 3 confirmed cases. By August 16, 2024, there were 100 and 299 suspected confirmed cases and no deaths. Children <5 account for 38% of the cases.

## *Cameroon (Clade Iib Outbreak)*

Since the beginning of 2024, [Cameroon has recorded](#) 35 confirmed and suspected mpox cases and 2 deaths. Of the 5 laboratory confirmed cases, all were clade II.

## *CAR (Clade Ia Outbreak)*

Since the start of the year, CAR has detected 263 confirmed and suspected clade Ia mpox cases and no deaths across 6 of its 7 health regions. Of the confirmed cases, children <15 years of age account for 43% of the cases.

## *Cote d'Ivoire (Clade II Outbreak)*

As of August 16, 2024, the [Cote d'Ivoire](#) reported 2 confirmed mpox cases and activated its emergency health system in response. The [WHO reports](#) that the outbreak is clade II.

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## *Ghana (Unknown Clade Outbreak)*

Since the beginning of the year, Ghana has reported [4 confirmed mpox](#) cases and no deaths.

## *Kenya (Clade Ib Outbreak)*

On July 31, 2024, the [Kenyan Ministry of Health](#) announced an outbreak of mpox linked to an individual who traveled from Uganda to Rwanda via Kenya. [WHO confirmed](#) the subclade is clade Ib.

## *Liberia (Clade II Outbreak)*

Since the beginning of the year, Liberia has detected 5 confirmed mpox cases and no deaths. [WHO reports](#) that the outbreak is clade II.

## *Nigeria (Clade Iib Outbreak)*

[Nigeria has reported](#) 39 laboratory confirmed cases of clade II mpox and no deaths for the year to date. Young children (<10 years old) account for 38% of the caseload in Nigeria. Nigeria is the only country in Africa besides the DRC that currently has [authorized vaccine distribution and use](#).

## *Republic of the Congo (ROC) (Clade Ia Outbreak)*

[ROC has recorded](#) 169 confirmed and suspected cases of clade I mpox and 1 death since the beginning of the year. [WHO confirmed](#) that the subclade is clade Ia.

## *Rwanda (Clade Ib Outbreak)*

The Rwandan Ministry of Health [reported 4 confirmed](#) cases of clade Ia mpox [WHO confirmed](#) that the subclade is clade Ib.

## *South Africa (Clade Iib Outbreak)*

In early May 2024, the Government of South Africa announced its first confirmed case of mpox clade Iib linked to the ongoing global outbreak. Since then, the Department of Health has reported [24 confirmed cases and 3 deaths](#). The cases are all male, aged between 17 and 43 years, almost all self-identified as men who have sex with men, most are living with HIV, and many [displayed severe clinical presentation](#) and were hospitalized for mpox. Of 5 cases with available viral sequence data, all were [confirmed to be clade Iib](#).

## *Uganda (Clade Ib Outbreak)*

On August 3, 2024, Uganda reported its first 2 cases of mpox ever in people who had crossed the border into DRC. [WHO confirmed](#) the cases were clade Ib.



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