

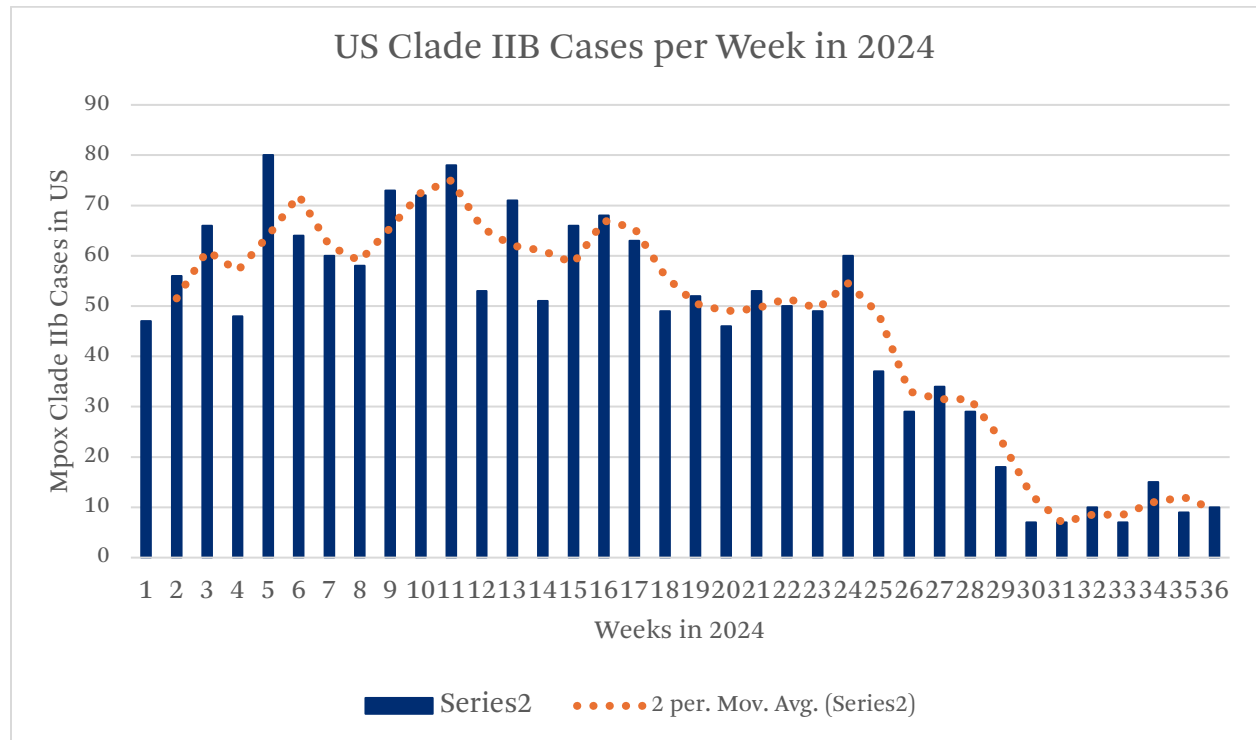
# Mpox Virus: Clade I and Clade II



## 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 103,048 cases](#) and more than 229 deaths reported in 121 countries, though world-wide 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](#) 33,799 mpox cases August 27, 2024. The US outbreak has continued to grow at a low but steady pace in 2024, with [2,025 new cases](#) recorded year to date as of September 7, 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.

## US Epi Curve:



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## Key Updates

### Global Response

- The [WHO added the MVA-BN vaccine to its prequalification list](#) on September 13, 2024, which will allow speedier procurement and country-based approval processes of the Bavarian Nordic vaccine.
- The [50,000 of US-donated JYNNEOES vaccines](#) arrived in DRC on September 10, 2024.
- On September 5, 2024 the [DRC received 99,000 doses](#) of their first batch of mpox vaccines, donated by the European Union and manufactured by Bavarian Nordic.

### Both Clades

- On September 12, 2024, [Morocco confirms its first case of mpox](#) (clade currently unknown) and [Africa CDC released](#) a situation update as all 5 regions of the continent now have cases of mpox.
- There are multiple new and ongoing outbreaks of mpox clades Ia, Ib, and IIB across Central and West Africa. [As of September 13, 2024](#), a total of 26,544 cases (5,732 confirmed; 20,812 suspected) and 724 deaths (case fatality ratio [CFR] of 2.73%) were reported from 15 African Union Member States. DRC accounts for about 96% of cases and deaths.
- On September 3, 2024, [Guinea reported their first outbreak of mpox](#) (clade unknown) since 2022. There have been 24 reported cases (1 confirmed) and no deaths from this new outbreak.
- [Jordan's health ministry](#) reported their first case since 2022 on September 2, 2024.

### Clade IIB

- On September 8, 2024, [India reported](#) a case of mpox in an individual with a recent travel history. [Later testing confirmed](#) clade IIB.

### Clade I

- [Increases in cases continue](#) to be documented in Burundi, Central African Republic (CAR), DRC, Nigeria, and Uganda.
- Since the beginning of the year,, DRC has recorded more than 20,000 confirmed or suspected cases, with 6over 600 deaths (see detailed DRC section below).
- 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](#).

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## 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. 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](#).

This new mode of sexual 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.

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## 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 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

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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.

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 Global Response

### *World Health Organization*

In his opening remarks at an information session on mpox on August 23, 2024, WHO Director-General called for [\\$135 million in emergency funding](#) to address the growing mpox outbreak

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.

### *Africa Centres for Disease Control and Prevention (Africa CDC)*

Africa CDC declared this outbreak 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.

### *European Union (EU)*

The [EU announced](#) that they aim to deliver 566,000 doses of Bavarian Nordic mpox vaccine to affected countries throughout Africa. The first batch of 99,000 doses arrived in the DRC on September 6, 2024 and more are routed for Burundi.

### *United States*

[50,000 doses](#) of US-donated JYNNEOS vaccine arrived in DRC on September 10, 2024.

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## *USAID*

USAID has announced on August 20, 2024 [an additional \\$35 million](#) in support for the mpox outbreak in Central and Eastern Africa, bringing total US financial support to \$55 million.

## *US Centers for Disease Control and Prevention (US CDC)*

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 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.

## **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 [33,799 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 of September 8, 2024, [Africa CDC has reported](#) 24,873 confirmed or suspected cases of clade I mpox and 635 deaths in DRC, for a CFR of 2.5%. 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 [half of the country's suspected cases](#) and three-quarters of deaths in 2024 alone. The clade I



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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 in Africa, Asia, and Europe in 2024, including:

## **Africa**

### *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 September 14, 2024](#), there 1,489 confirmed or suspected cases and no deaths. Children <15 account for 54% of the cases. Since the last situation update (August 30, 2024), there has been a 93% decrease in reporting of suspected and confirmed cases in Burundi, and cases are likely being under reported [with only one testing facility in the country](#).

### *Cameroon (Clade Iib Outbreak)*

Since the beginning of 2024, [Cameroon has recorded](#) 42 confirmed and suspected mpox cases and 3 deaths. Of the 5 laboratory confirmed cases, all were clade II.

### *CAR (Clade Ia Outbreak)*

Since the start of the year, CAR has detected [278 confirmed and suspected clade Ia mpox cases](#) and one death across 6 of its 7 health regions. Of the confirmed cases, children <15 years of age account for 42% of the cases.

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## *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. Africa CDC [reports on September 8, 2024](#) a total of 181 confirmed cases and one death due to clade II mpox.

## *Gabon (Unknown Clade Outbreak)*

On August 22, 2023, the [Gabon Ministry of Health](#) confirmed a case of mpox in an individual with travel history to Uganda. By September 8, 2024, [Africa CDC reports](#) 15 cases and no deaths. Clade-specific details are not yet available, though clade Ib is likely given travel history and Gabon's proximity to other countries experiencing clade Ib mpox outbreaks.

## *Guinea (Unknown Clade Outbreak)*

On [September 3, 2024](#), the Guinea National Agency for Health Security reported 1 confirmed case and 23 suspected cases, the first outbreak since 2022. The confirmed case had no history of recent travel. There currently is no available clade-specific testing data.

## *Ghana (Unknown Clade Outbreak)*

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

## *Kenya (Clade II Outbreak)*

On July 31, 2024, the [Kenyan Ministry of Health](#) announced a case of mpox linked to an individual who traveled from Uganda to Rwanda via Kenya. On September 8, 2024, [Africa CDC reports](#) 5 confirmed cases and 16 suspected cases of clade II mpox.

## *Liberia (Clade II Outbreak)*

Since the beginning of the year, [Liberia has detected](#) 8 confirmed and 85 suspected mpox cases and no deaths. [WHO reports](#) that the outbreak is clade II.

## *Morocco (Unknown Clade Outbreak)*

On September 12, 2024, [Morocco reported their first case of mpox](#) (clade details currently unknown). Africa CDC released an updated outbreak report as cases of [mpox continue to expand within the continent](#) and have now reached all 5 regions.

## *Nigeria (Clade IIb Outbreak)*

[Nigeria has reported](#) 916 cases (48 laboratory confirmed) of clade II mpox and no deaths for the year to date. Since the last update (August 30, 2024), this is an 8-fold increase in caseload. Young children (<10 years old) account for 35% of the confirmed cases in Nigeria.



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

[ROC has recorded](#) 162 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 I Ib Outbreak)*

In early May 2024, the Government of South Africa announced its first confirmed case of mpox clade I Ib 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 I Ib](#).

## *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. On September 8, 2024, there are a total of [10 confirmed cases](#) of clade Ib mpox.

## **Asia**

### *India (Clade I Ib Outbreak)*

On September 8, 2024, [India reported](#) a case of [clade I Ib mpox](#) on September 8, 2024 in an individual with a recent travel history.

### *Jordan (Unknown Clade Outbreak)*

On September 2, 2024 [Jordan's health ministry](#) announced that they had detected their first case of mpox since 2022. The 33-year-old man is not a resident of the country and is currently in isolation. No clade specific information is available at this time.

### *Pakistan (Clade I Outbreak)*

On August 16, 2024, [Pakistan detected its first case](#) of clade I mpox (no subclade detected). The individual who tested positive has a recent travel history to the Middle East.

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## *Philippines (Clade IIb Outbreak)*

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. [As of September 16, 2024](#), the Health Secretary announced 18 cases, all of which are clade II.

## *Singapore (Clade IIb Outbreak)*

On August 22, 2024, the Singapore Ministry of Health confirmed [13 cases of clade II](#) mpox.

## *Thailand (Clade Ib Outbreak)*

[Thailand reported](#) its first suspected case of [clade Ib](#) on August 23, 2024. The individual who had tested positive had recently traveled from the Africa region.

## Europe

### *Sweden (Clade Ib Outbreak)*

On August 15, 2024, [Sweden reported its first case](#) of clade I mpox, detected in an individual who has recently traveled to areas with cases of mpox in Africa.

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