

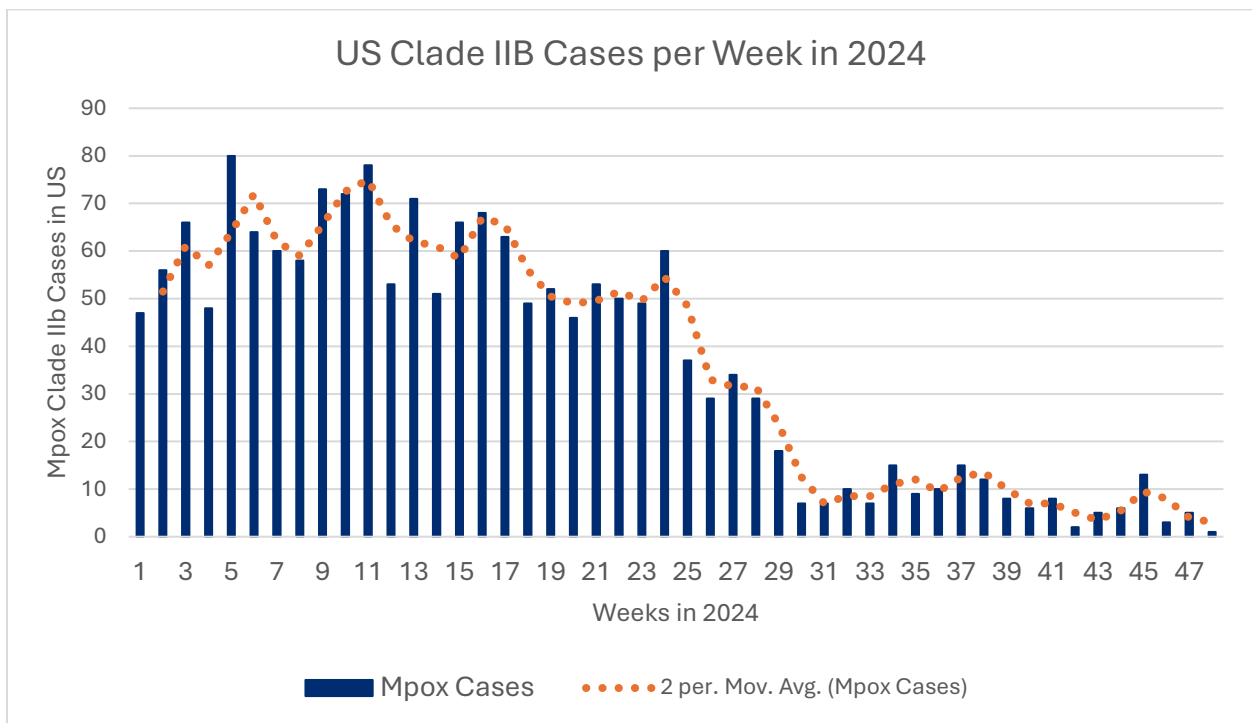
Mpox Virus: Clade I and Clade II



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 been [more than 15,101 cases](#) and more than 255 deaths reported in 126 countries, though worldwide 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) and the World Health Organization (WHO), the [US has reported](#) 34,187 mpox cases as of October 31, 2024. The US outbreak has continued to grow at a low but steady pace in 2024, with [2,509 cases recorded year to date as of November 30, 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:



Mpox Virus: Clade I and Clade II



Key Updates

Global Response

- The [WHO](#) is investigating the data on ACAM2000 to determine if it is eligible for prequalification or emergency use authorization.
- The WHO released their 43rd multi-country mpox report, which includes a [risk assessment](#) of national and international spread for clade Ia, Ib, IIa, and IIb.
- The UN authorized KM Biologics [LC16 vaccine for children >1](#) year old on November 20, 2024.
- The WHO [extended their PHEIC declaration](#) for mpox on November 22, 2024.
- The [WHO added the Japanese KM Biologics LC16 vaccine to its emergency use authorization list](#), making it the second vaccine to be approved for mpox prevention.
- Africa CDC approved the first mpox diagnostic tool that is manufactured on the continent, a real-time [PCR test developed in Morocco](#).
- The [WHO approved the age extension authorization](#) for the prequalified MVA-BN vaccine to include children ages 12-17, per the European Medicines Agency recommendation.

Both Clades

- [Angola's Ministry of Health](#) confirmed their first case of mpox (clade unknown) on November 16, 2024.
- There are multiple new and ongoing outbreaks of mpox clades Ia, Ib, and IIb across Africa. [As of November 18, 2024](#), a total of 55,413 cases (12,162 confirmed) and 1,142 deaths (case fatality ratio [CFR] of 2.1%) were reported from 20 African Union Member States. DRC accounts for about 80% of cases and deaths.

Clade I

- Cases in [the DRC have begun to plateau](#), while case detection in Burundi continues to rise. [Experts expect cases to plateau](#) or drop globally in the coming months.
- The [UK confirmed that a fifth individual](#) was diagnosed with clade Ib mpox. The four other cases originated from a housemate with a recent travel history to Uganda.
- [Canada](#) detected their first case of clade Ib mpox in an individual with a recent travel history on November 22, 2024.
- On November 16, 2024, [the first case of clade Ib mpox was detected in the US](#), which had previously only detected clade II cases. The individual was diagnosed in California after recent travel to West Africa.
- [Increases in clade I cases continue](#) to be documented across the African Continent (see details on country-specific case and death counts 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.

Mpox Virus: Clade I and Clade II



Clade II

- A [MMWR from October 10, 2024](#) discussed a second cluster of mpox cases in the US that were caused by tecovirimat-resistant monkeypox virus.

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. Notably, 4.3%–5.7% of all suspected and confirmed clade I cases in DRC reported from January 1, 2023, to April 14, 2024,

Mpox Virus: Clade I and Clade II



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.

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

Mpox Virus: Clade I and Clade II



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 WHO [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.

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

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. On November 19, 2024, [Japan's KM Biologics vaccine LC16](#) was granted emergency use authorization by the WHO as well.

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 \(PHEIC\)](#). The [PHEIC declaration was extended](#) on November 22, 2024. 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.

Mpox Virus: Clade I and Clade II



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.

GAVI

[GAVI announced](#) on September 18, 2024, that they will purchase, transport, deliver, and administer 500,000 doses of the Bavarian Nordic vaccine across Africa.

Global Fund

[The Global Fund announced](#) on September 18, 2024 that it will be supporting the DRC's efforts to combat mpox with \$9.5 million in emergency funds. Contributions include enhancing surveillance systems, boosting laboratory capacity, risk communication, infection prevention and control measures, supporting country-level coordination efforts, and strengthening health facility capacity.

United States

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

Profiles for Countries with Recent Outbreaks

United States (Clade IIb Outbreak)

Until November 16, 2024, [all mpox cases reported within the US were of the clade IIb subtype](#). The [first clade Ib case was detected](#) in an individual in California with a recent travel history to West Africa. There are no other reported cases of clade Ib circulating in the US. Since 2022, the US outbreak has grown to more than [34,187 cases](#) and 63 deaths. Recorded numbers of mpox cases were relatively stable in the ranges of 60-80 news cases per week in the first half of the year before dropping off and leveling out at 10-15 cases per week after the summer (see Epi curve on Page 1 for details). 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 December 9, 2024, [Africa CDC](#) has reported more than 48,000 cases of clade I mpox (10,158 confirmed) and 1,189 deaths in DRC, for a CFR of 1.17%. 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.

Mpox Virus: Clade I and Clade II



The current DRC clade I outbreak is widespread, [affecting all 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 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

Angola (Unknown Clade Outbreak)

On November 16, 2024, the [Angola Ministry of Health confirmed their first case of mpox](#), detected in an individual from the DRC. As of [December 9, 2024](#), Africa CDC reports 2 confirmed cases and no deaths. Clade-specific test results and travel history details are not yet available.

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 December 9, 2024](#), there have been 4,978 confirmed or suspected cases and one death. Children <15 account for 40% of the cases.

Cameroon (Clade II Outbreak)

Since the beginning of 2024, [Cameroon has recorded](#) 129 confirmed and suspected mpox cases and 2 deaths. Children under 15 years of age account for 11% of all confirmed cases.

Mpox Virus: Clade I and Clade II



CAR (Clade Ia Outbreak)

Since the start of the year, CAR has detected [462 confirmed and suspected clade Ia mpox cases](#) and three deaths. Of the confirmed cases, children <15 years of age account for 55% of the cases.

Cote d'Ivoire (Clade IIa and IIb 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 December 9, 2024](#) a total of 442 confirmed or suspected cases and one death due to clade II mpox.

Gabon (Clade Ia Outbreak)

On August 22, 2024, the [Gabon Ministry of Health](#) confirmed a case of mpox in an individual with travel history to Uganda. By October 26, 2024, [Africa CDC reports](#) 24 cases and no deaths.

Ghana (Clade IIb Outbreak)

On October 2, 2024, [Ghana reported their first confirmed mpox case of the year to Africa CDC](#). The case was detected in a 15-year-old male with no travel or sexual history. [Since the beginning of the year](#), there have been 230 suspected cases, two of which have been confirmed and no deaths.

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 data. As of September 30, 2024, [Africa CDC reports](#) 41 cases (1 confirmed).

Kenya (Clade Ib 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. As of December 9, 2024, [Africa CDC reports](#) 23 confirmed cases and one death.

Liberia (Clade II Outbreak)

In September and August of 2024, [Liberia has detected](#) 8 confirmed and 85 suspected mpox cases and no deaths. [Africa CDC reports](#) a total of 315 suspected or confirmed cases and no deaths as of November 18, 2024. 41% of cases are children <15 years of age.

Mauritius (Unknown Clade Outbreak)

The Mauritius Ministry of Health reported their [first case of mpox](#) (clade unknown) on October 27, 2024. The case was detected in an individual who had recently traveled to Kenya.

Mpox Virus: Clade I and Clade II



Morocco (Clade IIb Outbreak)

On September 12, 2024, [Morocco reported their first case of mpox](#). 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)

On December 9, 2024 [Nigeria has reported](#) 1,297 cases (118 laboratory confirmed) of clade II mpox and no deaths for the year to date

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. On November 3, 2024, [Africa CDC](#) reported a total of 249 cases (22 confirmed) and no deaths. Children under 15 years of age account for 38% of all cases.

Rwanda (Clade Ib Outbreak)

In August 2024, the Rwandan Ministry of Health [reported 4 confirmed](#) cases of clade Ia mpox [WHO confirmed](#) that the subclade is clade Ib. By [December 9, 2024](#), Africa CDC confirms 52 cases and no deaths.

South Africa (Clade IIb Outbreak)

In May 2024, South Africa announced its first confirmed case of mpox clade IIb. By [September 9, 2024](#), South Africa has reported [25 confirmed cases and 3 deaths](#). The cases are all male, aged between 17-43 years, almost all self-identified as MSM, 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. As of December 9, 2024, there are a total of [784 confirmed cases and 4 deaths](#) of clade Ib mpox.

Zambia (Unknown Clade Outbreak)

On October 10, 2024, [the Zambian Ministry of Health confirmed the first case](#) of mpox in a 32-year old male Tanzanian truck driver. There is no clade-specific data currently available.

Zimbabwe (Unknown Clade Outbreak)

The [Zimbabwe Ministry of Health](#) declared their first case of mpox on October 13, 2024, detected in an 11-year-old male with a recent travel history. [By October 21, 2024](#), there have been 2 cases and no deaths. There is no clade-specific information available currently.

Mpox Virus: Clade I and Clade II



Europe

UK (Clade Ib Outbreak)

The UK Health Security Administration announced on October 30, 2024, that they had detected [their first case of clade Ib mpox](#) in an individual with a recent travel history. On [November 9, 2024](#), 4 total cases were reported, all housemates. [On December 1, 2024, a fifth case was reported](#), the first case that is not connected to the individual who had returned from Uganda in early November.

North America

Canada (clade Ib Outbreak)

On November 22, 2024, the [Public Health Agency of Canada](#) announced that the first case of clade Ib mpox was detected in an individual who had recently traveled to a country in Africa with a current mpox outbreak. Clade IIb cases of mpox have been detected in Canada since 2022.



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Mpox Virus: Clade I and Clade II



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Mpox Virus: Clade I and Clade II



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