

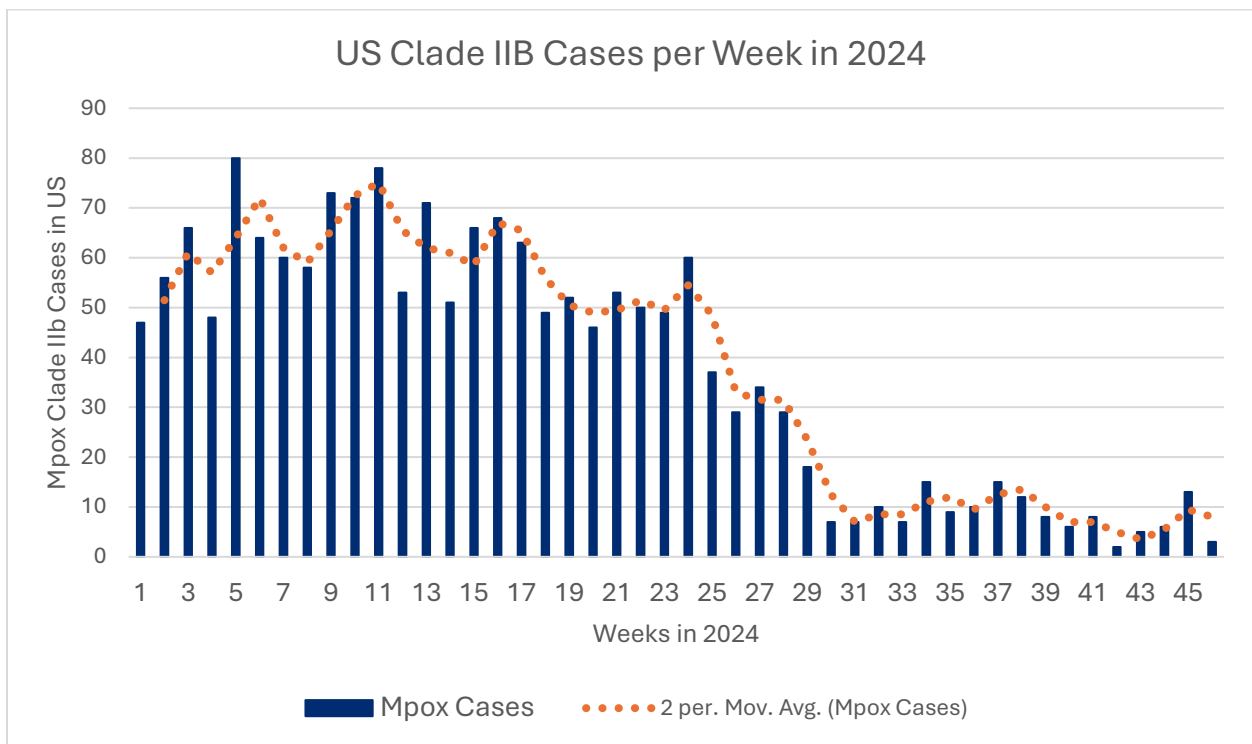
Mpox Virus: Clade I and Clade II



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 115,101 cases](#) and more than 255 deaths reported in 126 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) 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 [2,481 cases recorded year to date as of November 16, 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 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.
- [Vaccination campaigns continue to be delayed](#), notably in the DRC, as coordination efforts stall. As of October, [only 20% of the doses](#) provided to the DRC have been administered and children > 12 in the DRC are still not eligible for vaccination.
 - [Nigeria's campaign began administering vaccines](#) on November 18, 2024, more than three weeks after the initiative was slated to start.
- Africa CDC approved the first mpox diagnostic tool that is manufactured on the continent, a real-time [PCR test developed in Morocco](#).
- Africa CDC launched a [clinical trial](#) in the DRC that tests the smallpox drug Brincidofovir for mpox treatment on November 8, 2024.
- The WHO [approved two new mpox diagnostic tests](#) for emergency use on October 30, 2024. Both Xpert Mpox and cobas MPVX assay are PCR-based tests that can produce results in under 2 hours.
- 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.
- [Mauritius](#) announced their first case of mpox (clade unknown) on October 27, 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

- [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.
- Zimbabwe announced their [first two cases of mpox \(clade Ib\)](#) on October 13, 2024.
- [Zambia announced their first case of mpox \(clade Ib\)](#) on October 10, 2024.

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- The [UK detected](#) their first case of clade Ib mpox on October 30, 2024 in an individual with a recent travel history. [4 new cases](#) were reported on November 9, 2024.
- [Increases in clade I cases continue](#) to be documented across the African Continent (see details on country-specific case and death counts below).
- [Since the beginning of the year](#), DRC has recorded more than 48,000 confirmed or suspected cases, with over 1,100 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.

Clade II

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

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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.

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.

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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 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 IIb.

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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 November 3, 2024, [WHO](#) has reported 48,163 cases of clade I mpox (8,662 confirmed) and 1,146 deaths in DRC, for a CFR of 2.4%. 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.

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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. 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 November 18, 2024](#), there have been 3,864 confirmed or suspected cases and no deaths. Children <15 account for 48% of the cases.

Cameroon (Clade II Outbreak)

Since the beginning of 2024, [Cameroon has recorded](#) 111 confirmed and suspected mpox cases and 2 deaths. Children under 15 years of age account for 60% of all confirmed cases.

CAR (Clade Ia Outbreak)

Since the start of the year, CAR has detected [403 confirmed and suspected clade Ia mpox cases](#) and two deaths across 6 of its 10 regions. Of the confirmed cases, children <15 years of age account for 53% of the cases.

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Cote d'Ivoire (Clade IIa 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 November 18, 2024](#) a total of 412 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 November 18, 2024, [Africa CDC reports](#) 17 confirmed cases and one death.

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. [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.

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.

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Nigeria (Clade IIb Outbreak)

On October 21, 2024 [Nigeria has reported](#) 1,297 cases (94 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)

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 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 November 18, 2024, there are a total of [443 confirmed cases and one death](#) 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.

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 more cases were reported.

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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.

References

- Africa CDC. [@AfricaCDC]. #Mpox Vaccination is Underway in 6 Provinces across the #DRC. Tweet. X. Published October 25, 2024. Accessed October 28, 2024. <https://x.com/AfricaCDC/status/1849692563780882898>
- Africa CDC. [@AfricaCDC]. The #Mpox Outbreak in the #DRC is Showing a Concerning New Trend. Tweet. X. Published October 24, 2024. Accessed October 28, 2024. <https://x.com/AfricaCDC/status/1849516509820748214>
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published September 16, 2024. Accessed September 23, 2024. <https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-september-2024/?ind=1726726536990&filename=Africa-CDC-Epidemic-Intelligence-Report-13Sept24-1.pdf&wpdmdl=18246&refresh=66f150cbb5f101727090891>
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published September 30, 2024. Accessed September 30, 2024. https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-september-2024/?ind=1727777051433&filename=Africa_CDC_Epidemic_Intelligence_Weekly_Report_27_September_2024.pdf&wpdmdl=18246&refresh=66fbc86825281727777670
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published October 6, 2024. Accessed October 6, 2024. <https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-october-2024/?ind=1728284921707&filename=Africa-CDC-Epidemic-Intelligence-Weekly-Report-06-October-2024.pdf&wpdmdl=18247&refresh=67038bb08ef221728285616>
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published October 12, 2024. Accessed October 14, 2024. https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-october-2024/?ind=1728849665555&filename=Africa_CDC_Epidemic_Intelligence_Weekly_Report_12-October-2024.pdf&wpdmdl=18247&refresh=670ceabf7f9481728899775
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published October 26, 2024. Accessed October 28, 2024. https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-october-2024/?ind=1730102859665&filename=Africa_CDC_Epidemic_Intelligence_Weekly_Report_26_October_2024-vll.pdf&wpdmdl=18247&refresh=671f472006ec51730103072

Mpox Virus: Clade I and Clade II



- Africa CDC. Africa CDC Epidemic Intelligence Report. Published November 3, 2024. Accessed November 4, 2024. <https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-november-2024/?ind=1730627706051&filename=Africa-CDC-Epidemic-Intelligence-Report-03Nov24-vl.pdf&wpdmdl=18248&refresh=6728ce9e3415e1730727582>
- Africa CDC. Africa CDC Epidemic Intelligence Report. Published November 18, 2024. Accessed November 18, 2024. https://africacdc.org/download/africa-cdc-weekly-event-based-surveillance-report-november-2024/?ind=1731925277043&filename=Africa-CDC-_Epidemic-Intelligence-_Weekly-Report-_18Nov2024.pdf&wpdmdl=18248&refresh=673cb9d1750a31732032977
- Africa CDC. Morocco's First Homegrown PCR Test for Mpox gets Africa CDC Nod. Published November 12, 2024. Accessed November 18, 2024. <https://africacdc.org/news-item/moroccos-first-homegrown-pcr-test-for-mpox-gets-africa-cdc-nod/>
- Africa CDC. Mpox Situation in Africa. Published July 31, 2024, 2024. Accessed September 23, 2024. <https://africacdc.org/wp-content/uploads/2024/08/MPox-Situation-in-Africa.pdf>
- Africa CDC. Mpox Situation in Africa. Published September 13, 2024. Accessed September 23, 2024. <https://africacdc.org/download/outbreak-report-13-september-2024-mpox-situation-in-africa>
- Associated Press. UK Identifies 4 New Cases of New Mpox Variant, the First Cluster Outside of Africa. Published November 6, 2024. Accessed November 11, 2024. <https://apnews.com/article/mpox-variant-clade-uk-africa-vaccine-cf54bba3e8731a30feac34f4006e9a15>
- Associated Press. UN Authorizes First Mpox Vaccine for Children in an Attempt to Control Congo Outbreak. *ABC News*. Published November 20, 2024. Accessed November 24, 2024. <https://abcnews.go.com/Health/wireStory/authorizes-1st-mpox-vaccine-children-attempt-control-outbreak-116041849>
- Cohen, J. 'I'm Really Shocked!' Children Not Being Vaccinated for Mpox in Congo. *Science*. Published November 22, 2024. Accessed November 25, 2024. <https://www.science.org/content/article/i-m-really-shocked-children-not-being-vaccinated-mpox-congo>
- European Centre for Disease Prevention and Control. Mpox infographics: staying prepared for the summer season. Published June 1, 2023. Accessed September 23, 2024. <https://www.ecdc.europa.eu/en/news-events/mpox-infographics-staying-prepared-summer-season>
- European Commission. Mpox Vaccines Delivered to Rwanda Amid Broader Health Response Efforts. *Health Emergency Preparedness and Response Authority*. Published October 7, 2024. Accessed October 7, 2024. https://health.ec.europa.eu/latest-updates/mpox-vaccines-delivered-rwanda-amid-broader-health-response-efforts-2024-10-07_en
- Duggan, J. First UK Case of Deadly Strain of Mpox Virus Detected. *iNews*. Published October 30, 2024. Accessed November 11, 2024. <https://inews.co.uk/news/first-case-deadly-strain-mpox-virus-3352996>
- Eboh, C. Nigeria Begins Delayed Mpox Vaccination Programme. *Reuters*. Published November 18, 2024. Accessed November 18, 2024.

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<https://www.reuters.com/business/healthcare-pharmaceuticals/nigeria-begins-delayed-mpox-vaccination-programme-2024-11-18/>

- Ghazy RM, Elrewany E, Gebreal A, et al. Systematic Review on the Efficacy, Effectiveness, Safety, and Immunogenicity of Monkeypox Vaccine. *Vaccines*. 2023;11(11):1708. doi:10.3390/vaccines11111708
- Gigante CM, Takakuwa J, McGrath D, et al. Notes from the Field: Mpox Cluster Caused by Tecovirimat-Resistant Monkeypox Virus — Five States, October 2023–February 2024. *MMWR Morb Mortal Wkly Rep* 2024;73:903–905. DOI: <http://dx.doi.org/10.15585/mmwr.mm7340a3>
- Global Fund. Global Fund Provides Nearly US\$10 Million for DRC's Mpox Response. Published September 18, 2024. Accessed September 23, 2024. <https://www.theglobalfund.org/en/news/2024/2024-09-18-global-fund-provides-nearly-us-10-million-drc-mpox-response/>
- Kamale, JY. First Doses of Mpox Vaccine from the United States Arrive in Congo. *AP News*. Published September 10, 2024. Accessed September 23, 2024. <https://apnews.com/article/mpox-vaccines-congo-united-states-d4f276d1bde33529a7e0783ee0aa5dce>
- Kaseya, J. Speech of the Director General / Africa CDC on the Declaration of Mpox as a Public Health Emergency of Continental Security (PHECS). *Africa CDC*. Released August 13, 2024. Accessed September 23, 2024. <https://africacdc.org/news-item/speech-of-the-director-general-africa-cdc-on-the-declaration-of-mpox-as-a-public-health-emergency-of-continental-security-phecs/>
- Kasongo, AA. Mpox Vaccination Shortage Delays Kinshasa's Campaign, Congo Organizer Says. *Reuters*. Published November 13, 2024. Accessed November 18, 2024. <https://www.reuters.com/world/africa/mpox-vaccination-shortage-delays-kinshasas-drive-against-outbreak-2024-11-13/>
- Kasongo, AA. and Makangara J. Congo Receives Long-Awaited Mpox Vaccine Doses. *Reuters*. Published September 6, 2024. Accessed September 23, 2024. <https://www.reuters.com/world/africa/first-batch-mpox-vaccine-doses-arrives-congo-2024-09-05/>
- Kenya Ministry of Health [@MOH_Kenya]. Press Release: Ministry of Health Confirms Mpox Outbreak at Taita-Taveta Border Point. Tweet. X. Published July 31, 2024. Accessed September 23, 2024. https://x.com/MOH_Kenya/status/1818620519140192307.
- McQuiston JH, Braden CR, Bowen MD, et al. The CDC Domestic Mpox Response — United States, 2022–2023. *MMWR Morb Mortal Wkly Rep*. 2023;72:547–552. doi:10.15585/mmwr.mm7220a2
- McQuiston JH, Luce R, Kazadi DM, et al. U.S. Preparedness and Response to Increasing Clade I Mpox Cases in the Democratic Republic of the Congo — United States, 2024. *MMWR Morb Mortal Wkly Rep*. 2024;73:435–440. doi:10.15585/mmwr.mm7319a3
- Mougougou, A. Déclaration du Premier Cas de MPOX au Gabon. *Republique Gabonaise Ministère de la Santé et Des Affaires Sociales*. Published August 22, 2024. Accessed August 26, 2024. <https://www.sante.gouv.ga/9-actualites/1190-declaration-du-premier-cas-de-mpox-au-gabon/>

Mpox Virus: Clade I and Clade II



- Pronczuk, M. Global Vaccine Alliance GAVI to Buy 500,000 Doses of Mpox Vaccine. Published September 18, 2024. Accessed September 23, 2024. <https://apnews.com/article/congo-vaccine-mpox-gavi-ed0c0b3d09eef30dff33715e185d4dbd>
- Public Health Agency of Canada. Public Health Agency of Canada Confirms the First Case of Clade I Mpox in Canada. Released November 22, 2024. Accessed November 25, 2024. <https://www.canada.ca/en/public-health/news/2024/11/public-health-agency-of-canada-confirms-the-first-case-of-clade-i-mpox-in-canada.html>
- Reuters. Morocco Reports First Mpox Case. Published September 12, 2024. Accessed November 11, 2024. <https://www.reuters.com/world/africa/morocco-reports-first-mpox-case-2024-09-12/>
- Reuters. WHO Approves Bavarian Nordic's Mpox Vaccine for Adolescents. Published October 14, 2024. Accessed November 11, 2024. <https://www.reuters.com/business/healthcare-pharmaceuticals/who-approves-bavarian-nordics-mpox-vaccine-adolescents-2024-10-14/#:~:text=Children%2C%20adolescents%20and%20those%20with,skin%20lesions%20filled%20with%20pus.>
- Reuters. WHO to Convene Emergency Meeting on Mpox on Nov. 22. *U.S. News and World Report*. Published November 11, 2024. Accessed November 11, 2024. <https://www.usnews.com/news/top-news/articles/2024-11-11/who-to-convene-emergency-meeting-on-mpox-on-nov-22>
- Reuters. WHO Lists Mpox Vaccine by Japan's KM Biologics for Emergency Use. Published November 19, 2024. Accessed November 19, 2024. <https://www.reuters.com/business/healthcare-pharmaceuticals/who-lists-mpox-vaccine-by-japans-km-biologics-emergency-use-2024-11-19/>
- Sawasawa, M. First U.S. Case of Spreading New Mpox Type Reported in California. *The New York Times*. Published November 16, 2024. Accessed November 18, 2024. <https://www.nytimes.com/2024/11/16/health/mpox-california.html>
- Schnirring, L. Mpox Clade 1b Spreads to More African Countries. *CIDRAP*. Published November 14, 2024. Accessed November 18, 2024. <https://www.cidrap.umn.edu/mpox/mpox-clade-1b-spreads-more-african-countries>
- Schnirring, L. WHO Extends Public Health Emergency for Mpox. *CIDRAP*. Published November 22, 2024. Accessed November 25, 2024. <https://www.cidrap.umn.edu/mpox/who-extends-public-health-emergency-mpox>
- Soucheray, S. Africa CDC Launches Trial of Smallpox Drugs for Mpox. *CIDRAP*. Published November 8, 2024. Accessed November 11, 2024. <https://www.cidrap.umn.edu/mpox/africa-cdc-launches-trial-smallpox-drug-mpox>
- United Nations. WHO Chief Convenes Expert Meeting on Mpox Spread. Published August 7, 2024. Accessed November 11, 2024. <https://news.un.org/en/story/2024/08/1152931>
- USAID. The United States Announces \$424 Million in Additional Assistance for the Democratic Republic of the Congo. Released August 7, 2024. Accessed September 23, 2024. <https://www.usaid.gov/news-information/press-releases/aug-07-2024-united-states-announces-424-million-additional-assistance-democratic-republic-congo>

Mpox Virus: Clade I and Clade II



- USAID. USAID Announces Additional \$35 Million to Support Mpox Outbreak Response in Central and Eastern Africa. Published August 20, 2024. Accessed September 23, 2024. <https://www.usaid.gov/news-information/press-releases/aug-20-2024-usaid-announces-additional-35-million-support-mpox-outbreak-response-central-and-eastern-africa>
- US Centers for Disease Control and Prevention. Clade I Mpox Outbreak Originating in Central Africa. Updated September 13, 2024. Accessed September 23, 2024. https://www.cdc.gov/mpox/outbreaks/2023/?CDC_AAref_Val=https://www.cdc.gov/poxvirus/mpox/outbreak/2023-drc.html
- US Centers for Disease Control and Prevention. Ongoing 2022 Global Outbreak Cases and Data | Mpox [ARCHIVED]. Updated March 5, 2024. Accessed August 19, 2024. <https://www.cdc.gov/poxvirus/mpox/response/2022/index.html>
- US Centers for Disease Control and Prevention. U.S. Case Trends. Updated September 2, 2024. Accessed September 23, 2024. https://www.cdc.gov/mpox/data-research/cases/?CDC_AAref_Val=https://www.cdc.gov/poxvirus/mpox/response/2022/mpx-trends.html
- US Centers for Disease Control and Prevention. Weekly Cases of Notifiable Diseases, United States, U.S. Territories, and Non-U.S. Residents Week Ending November 16, 2024 (Week 46). Updated November 16, 2024. Accessed November 25, 2024. <https://wonder.cdc.gov/nndss/static/2024/46/2024-46-table968.html>
- US Centers for Disease Control and Prevention. Mpox Caused by Human-to-Human Transmission of Monkeypox Virus in the Democratic Republic of the Congo with Spread to Neighboring Countries. Published August 7, 2024. Accessed September 23, 2024. <https://emergency.cdc.gov/han/2024/han00513.asp>
- US Food and Drug Administration. Authorization of Emergency Use of an In Vitro Diagnostic Device in Response to an Outbreak of Mpox; Availability. Published July 5, 2024. Accessed September 23, 2024. <https://www.federalregister.gov/documents/2024/07/05/2024-14719/authorization-of-emergency-use-of-an-in-vitro-diagnostic-device-in-response-to-an-outbreak-of-mpox>
- US Food and Drug Administration (FDA). Authorization of Emergency Use of Monkeypox Polymerase Chain Reaction Test Home Collection Kit in Response to an Outbreak of Mpox; Availability. Published July 5, 2024. Accessed September 23, 2024. <https://www.federalregister.gov/documents/2024/07/05/2024-14714/authorization-of-emergency-use-of-monkeypox-polymerase-chain-reaction-test-home-collection-kit-in>
- Vakaniaki E, Kacita C, Kinganda-Lusamaki E, et al. Sustained human outbreak of a new MPXV clade I lineage in eastern Democratic Republic of the Congo. *Nature Medicine*. Published April 15, 2024. Accessed September 23, 2024. <https://doi.org/10.1038/s41591-024-03130-3>
- World Health Organization. 2022-24 Mpox (Monkeypox) Outbreak: Global Trends. Updated September 30, 2024. Accessed September 30, 2024. https://worldhealthorg.shinyapps.io/mpx_global/_w_fd030bc5/#33_Maps
- World Health Organization. Department of Immunizations, Vaccines, and Biologicals (IBV). SAGE Meeting Slide Decks. Published March 2024. Accessed September 23, 2024. https://terrance.who.int/mediacentre/data/immunization/SAGE_Slidedeck_March_2024.pdf

Mpox Virus: Clade I and Clade II



- World Health Organization. Mpox (monkeypox) - Democratic Republic of the Congo. Published November 23, 2023. Accessed September 23, 2024. <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON493>
- World Health Organization. Mpox - South Africa. Published 9 July 2024. Accessed September 23, 2024. <https://www.who.int/emergencies/disease-outbreak-news/item/2024-DON525#>.
- World Health Organization. Multi-country outbreak of mpox, External situation report #34-28 June 2024. Published June 28, 2024. Accessed November 11, 2024. https://cdn.who.int/media/docs/default-source/health-emergency-information-risk-assessment/20240628_mpox_external-sitrep_34.pdf?sfvrsn=7a4abfce_1&download=true
- World Health Organization. Multi-country outbreak of mpox, External situation report #42- 9 November 2024. Published November 9, 2024. Accessed November 11, 2024. <https://www.who.int/publications/m/item/multi-country-outbreak-of-mpox--external-situation-report--42--9-november-2024>
- World Health Organization. Standing recommendations for mpox issued by the Director-General of the World Health Organization (WHO) in accordance with the International Health Regulations (2005) (IHR). Published August 21, 2024. Accessed November 11, 2024. [https://www.who.int/publications/m/item/standing-recommendations-for-mpox-issued-by-the-director-general-of-the-world-health-organization-\(who\)-in-accordance-with-the-international-health-regulations-\(2005\)-\(ihr\)](https://www.who.int/publications/m/item/standing-recommendations-for-mpox-issued-by-the-director-general-of-the-world-health-organization-(who)-in-accordance-with-the-international-health-regulations-(2005)-(ihr))
- World Health Organization. WHO Director-General Declares Mpox Outbreak a Public Health Emergency of International Concern. Released August 14, 2024. Accessed September 23, 2024. <https://www.who.int/news/item/14-08-2024-who-director-general-declares-mpox-outbreak-a-public-health-emergency-of-international-concern>
- World Health Organization. WHO Director-General's Opening Remarks at the Media Briefing. Published August 7, 2024. Accessed September 23, 2024. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing---7-august-2024>
- World Health Organization. WHO Director-General's Opening Remarks at Member States Information Session on Mpox - 23 August 2024. Published August 23, 2024. Accessed September 23, 2024. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-member-states-information-session-on-mpox-23-august-2024>
- World Health Organization. WHO Lists Additional Mpox Diagnostic Tests for Emergency Use. Published October 30, 2024. Accessed November 4, 2024. <https://www.who.int/news/item/30-10-2024-who-lists-additional-mpox-diagnostic-tests-for-emergency-use>
- World Health Organization. WHO Prequalifies the First Vaccine Against Mpox. Published September 13, 2024. Accessed September 23, 2024. <https://www.who.int/news/item/13-09-2024-who-prequalifies-the-first-vaccine-against-mpox>