

Implications for the EU/EEA of the outbreak of mpox caused by *Monkeypox virus* clade I in the Democratic Republic of the Congo

5 December 2023

Summary

- An outbreak of mpox is ongoing in the Democratic Republic of the Congo (DRC), with 12 569 cases reported between 1 January and 12 November 2023.
- The vast majority of infections are caused by *Monkeypox virus* (MPXV) clade I, which is generally considered to be more virulent than MPXV clade II.
- A cluster of mpox cases from March 2023 was recently documented as the first detection of sexually transmitted MPXV clade I infections. The presumed index case of this cluster is a European traveller who reportedly developed mpox soon after his arrival in DRC.
- Currently, there is no evidence that MPXV clade I is circulating outside certain central African countries and available MPXV sequences do not suggest circulation in the EU/EEA.
- The likelihood of infection from the ongoing epidemic mpox due to MPXV clade I is assessed as very low for the general EU population and the impact from such an infection is assessed as low. The overall risk is assessed as low.
- The overall risk for men who have sex with men (MSM) with multiple sexual partners in the EU/EEA from this outbreak in the DRC is low. Although the likelihood of infection with clade I virus for this population is considered higher than that of the general population, it is still estimated as low, as it is attenuated by the immunity in this population due to prior infection with MPXV clade II and/or vaccination in 2022-23. The impact from such infection is also estimated to be low, also influenced by increased immunity and availability of vaccines and therapeutics in the EU/EEA.
- Public health authorities should continue efforts to increase awareness among clinicians about mpox.
- Contact tracing, testing and sequencing of samples from detected mpox cases should continue, along with sharing the detected sequences. In the event of mpox case(s) with increased severity and/or the detection of a MPXV clade I infection, the event should be promptly communicated at the EU-level via EpiPulse.

Suggested citation: European Centre for Disease Prevention and Control. Epidemic of mpox caused by Monkeypox virus clade I in the Democratic Republic of the Congo. 5 December 2023. ECDC: Stockholm; 2023.

Catalogue number: TQ-02-23-360-EN-N
ISBN: 978-92-9498-678-8
doi: 10.2900/405228

Erratum – on 11 December 2023, page 4, the heading 'Phylogenetic overview of currently circulating MPXV genotypes worldwide' was replaced with 'Overview of MPXV genomes sequenced worldwide in 2023'. This section provides information on the number of MPXV genomic sequences available in public sequence databases and not about the evolutionary relationships among them. The new heading also clearly states the time frame of the analysis.

Event background

On 23 November 2023, the World Health Organization (WHO) [reported](#) an update on the ongoing mpox outbreak in the Democratic Republic of the Congo (DRC). In this report, a cluster of sexually transmitted *Monkeypox virus* (MPXV) clade I (formerly known as Congo basin clade) infections as well as cases among sex workers are described. This is the first reported sexual transmission of MPXV clade I. Since sexual transmission of MPXV has been driving the multi-country epidemic of mpox caused by MPXV clade II globally in 2022-23, evidence that clade I viruses can also be sexually transmitted requires assessment.

According to WHO, 12 569 suspected or confirmed mpox cases have been reported in DRC between 1 January and 12 November 2023, including 581 deaths (case-fatality ratio (CFR) 4.6%) [1]. Only MPXV clade I has been reported in the country. The current mpox epidemic in DRC involves 22 of the 26 DRC provinces (the disease is considered endemic in 11 provinces) [1]. Kinshasa, Lualaba, and South Kivu provinces reported mpox cases for the first time in 2023. Although mpox is endemic in DRC, the current epidemic has spread in more areas in the country and reported cases have increased at least two-fold since 2020, the previous year with the highest number of cases. The reason for this increase is unknown, although surveillance may have improved due to increased awareness. There is limited testing with only 1 106 suspected cases (8.8%) being tested so far [1].

In March 2023, a cluster of six sexually transmitted mpox cases (five male and one female) was reported in DRC. The cluster involved a man (index case), resident in Belgium, who arrived in Kinshasa on 15 March. He developed mild to moderate mpox-compatible symptoms on the day of arrival and was tested on 24 March [1]. Investigators were able to track 27 contacts, of whom six were tested and five were positive for MPXV. All five positive cases were sexual contacts of the index case. Sequencing confirmed that the index case as well as the five positive contacts were due to MPXV clade I, with closely related sequences and similar to strains circulating in DRC. Although the timing of the onset of symptoms in the index case points towards exposure in Belgium, no other mpox case has been identified in Belgium in recent months [2]. [A recent publication](#) suggests that the exposure of the index case happened in a European country during sexual contact with a suspected primary case who travels regularly to DRC [3].

Separately, several cases of mpox have been reported in DRC (South Kivu) among sex workers, further supporting the hypothesis of sexual transmission for MPXV clade I viruses.

Outbreaks of MPXV clade I also occur regularly in Cameroon and Central African Republic, and sporadically in other countries (e.g. Sudan and South Sudan).

The MPXV in certain African countries is probably maintained through circulation among small mammals and primates, with occasional spill-over events to humans. However, most cases in outbreaks, including the ongoing one, are transmitted person-to-person, including through sexual and non-sexual direct contact. The full dynamics of transmission in the ongoing outbreak in DRC are unclear at this point, as many cases are not laboratory confirmed and contact tracing is challenging.

Mpox outbreak caused by MPXV clade IIb

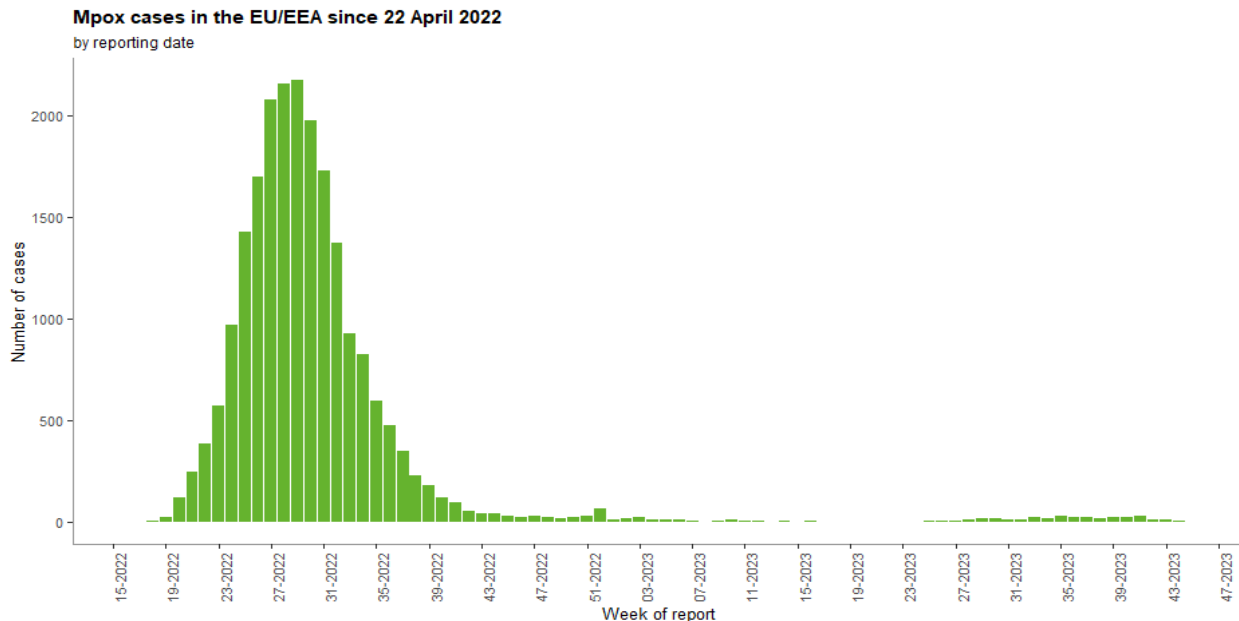
Epidemiological overview for the EU/EEA

Since the start of the multicountry mpox outbreak due to MPXV clade IIb in May 2022, and as of 28 November 2023, 21 586 confirmed cases of mpox and seven deaths have been reported from 29 EU/EEA countries. The five countries that have reported most cases since the start of the outbreak are: Spain (7 647), France (4 161), Germany (3 703), Netherlands (1 278) and Portugal (1 113). Belgium has reported 795 cases. Deaths have been reported from: Spain (3), Belgium (2), Czechia (1) and Portugal (1). Most cases were between 31 and 40 years-old (39%) and were male (98%). Of the male cases with known sexual orientation, 96% self-identified as men who have sex with men (MSM). Subpopulations of MSM associated with higher risk included MSM who attend sex-on-premises venues, MSM involved in group sex, chemsex or who recruit partners via apps, MSM with a recent history of bacterial sexually transmitted infections, MSM who are on PrEP, MSM engaged in sex work, and HIV-positive MSM [4].

During 2023 (as of 28 November), 472 mpox cases were reported from 21 EU/EEA countries in The European Surveillance System (TESSy). Portugal (163) and Spain (132) reported 64% of cases during 2023. Belgium has reported five cases in 2023, three in January, one in May and one in October. No deaths or admissions to intensive care units have been reported in 2023.

The number of cases of mpox in the EU/EEA in 2023 showed a large decrease compared to 2022. As shown in Figure 1 and 2, very few cases were reported in the spring of 2023. Cases picked up during the summer but remained far below the peak reported in 2022.

Among the 366 cases reported in 2023 with known hospitalisation status, 20 (5.3%) have been hospitalised, either for treatment (14 cases) or for other/unknown reasons (six cases). The proportion of cases hospitalised did not change in 2023 when compared to cases reported in 2022 (5.1%).

Figure 1. Number of confirmed mpox cases reported in the EU/EEA during 2022 and 2023, as of 28 November 2023

Overview of currently circulating MPXV genotypes worldwide

A total of 577 partial or complete MPXV sequences with a collection date between 1 January to 17 November 2023 were submitted to public sequence databases (GISAID and NCBI GenBank). These sequences were submitted by 20 countries; USA (n=289 sequences), Mexico (n=52), Japan (n= 48), South Korea (n= 27), Indonesia (n=21), Paraguay (n=18), Brazil (n=14), China (n=9), Taiwan (n=8), Ecuador (n=6), Dominican Republic (n=3), Pakistan (n=2), and 80 sequences were from EU countries; Austria (n=1), Belgium (n=9), Germany (n=12), Ireland (n=4), Netherlands (n=1), Portugal (n=45), Romania (n=6) and Spain (n=2) (Figure 3 and 4).

Figure 3. Publicly available partial or complete MPXV sequences with a collection date between 1 January to 17 November 2023, global distribution (n = 577)

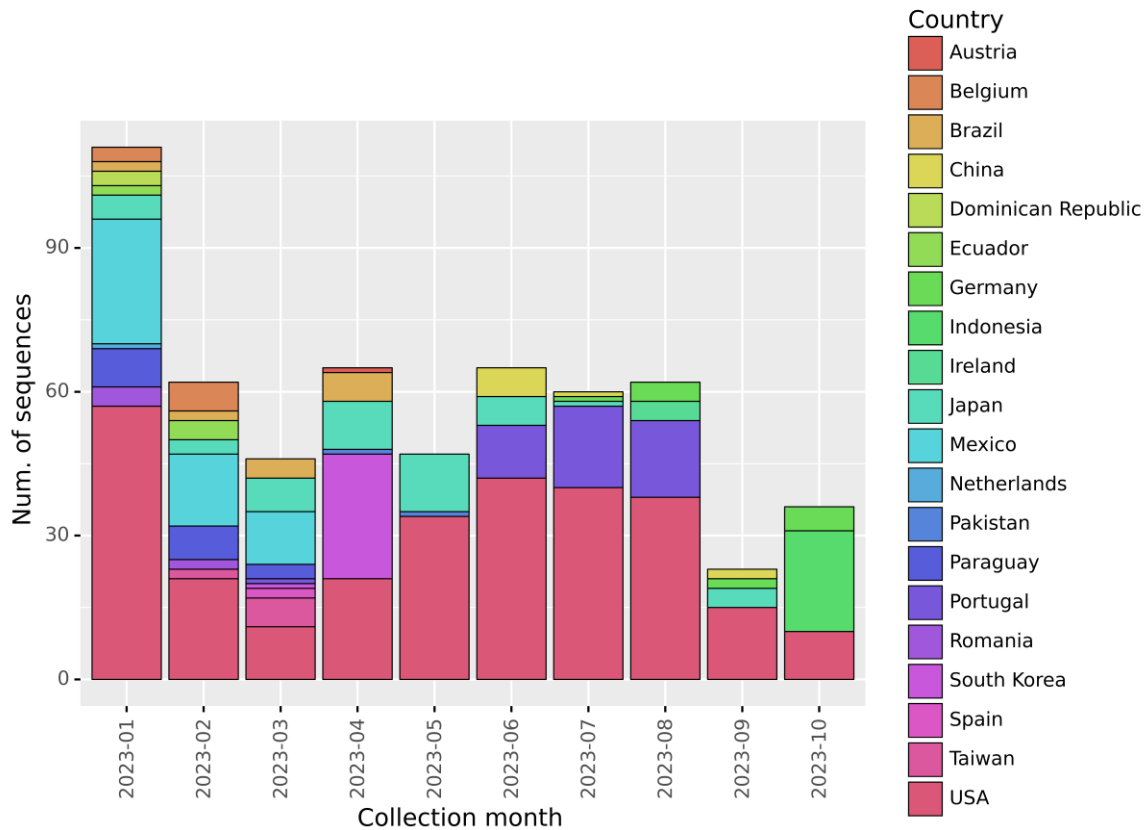
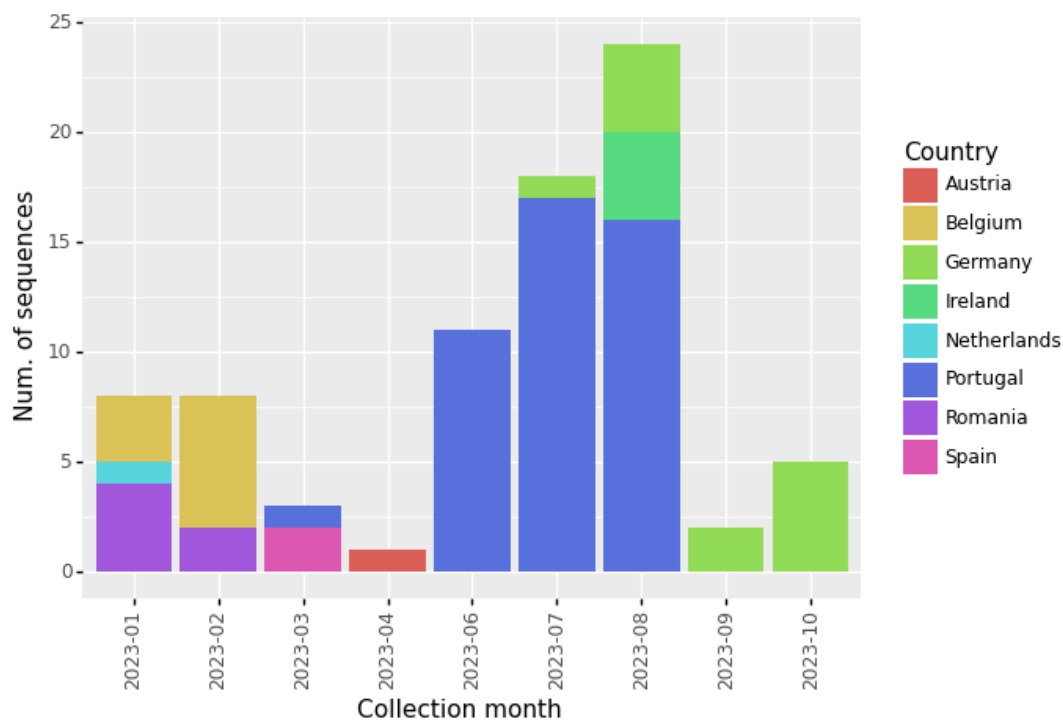


Figure 4. Publicly available partial or complete MPXV sequences with a collection date between 1 January to 17 November 2023 uploaded from EU/EEA countries (n = 80)



Note: The number of publicly available sequences does not reflect single cases and they may represent multiple samples from the same patient.

All 577 sequences but one fall into MPXV clade IIb; it was not possible to assign the clade for one sequence from China because of the low sequence quality.

Based on the available data in public sequence databases there is no indication that MPXV clade I has been detected among sequenced MPXV in Europe or in any other countries outside of the African continent during 2023.

ECDC threat assessment for the EU/EEA

What is the risk for the general population from the epidemic of mpox due to MPXV clade I in DRC?

The probability of importation of MPXV clade I depends on the extent of circulation in the DRC and other countries and the level of travel between those countries and the EU/EEA. To date, no cases of mpox from MPXV clade I have been reported as detected outside of the African continent [9]. Undetected circulation of MPXV clade I outside of the African continent is considered unlikely, although the number of MPXV sequences submitted in 2023 is relatively low and submitted by only a few countries globally. Additionally, generic MPXV or pan-Orthopoxvirus (pan-OPXV) PCR assays are usually used for the laboratory diagnosis of mpox worldwide, which might hinder the identification of MPXV clades. The doubling of reported cases in the DRC, and the first outbreak of its kind reported in the capital, Kinshasa, (with direct connections to Europe), may indicate an increased probability of introduction into Europe.

Even in the event of sporadic importation of the MPXV clade I, the likelihood of exposure for the general population in the EU/EEA is considered very low.

The secondary attack rate for clade II virus in household contacts (non-sexual) has been estimated to be around 3-5% [10]. Information on secondary attack rate for clade I is currently lacking.

Based on these elements, **the likelihood** of infection for the general population in the EU/EEA is considered **very low**.

According to historical data in past decades from outbreaks in countries in Africa, the impact of infection with clade I (morbidity and mortality) is expected to be higher than infection with MPXV clade II [11]. In comparison to DRC, with only MPXV clade I reported and a CFR of 4.6%, Nigeria, with MPXV clade II, reports a CFR of 0.5% [12]. Outbreaks with clade I have never been observed outside the African continent, therefore uncertainties still exist regarding this clade's severity.

Higher morbidity and mortality than the one observed in the MPXV clade II outbreak cannot be excluded in EU/EEA countries, particularly in immunocompromised persons, should such infections happen. Early pharmaceutical treatment and post-exposure vaccination can change the course of the disease.

Based on these elements, **the impact** of infection for the general population in the EU/EEA is considered **low**.

Considering both likelihood and impact, **the overall risk** in the general population is estimated as **low**.

What is the risk for the population of MSM with multiple sexual partners from MPXV clade I?

As the epidemic of MPXV clade I increases in the DRC, there is an increasing probability of it being introduced into Europe. In addition, according to the WHO report [1], cases infected with MPXV clade I have been detected in customers of clubs frequented by MSM in Kenge, in the DRC, whose members travel to other clubs in Central Africa and in Europe. This mobility increases the probability of introduction and spread of this virus clade into networks of MSM with multiple sexual partners, similar to the outbreak caused by the MPXV clade IIb in 2022-2023.

The likelihood of infection with clade I virus for the population of MSM with multiple sexual partners in the EU/EEA is expected to be attenuated by the immunity in this population due to prior infection with MPXV clade II and/or vaccination in 2022-23 (over 300 000 doses have been administered in 25 EU/EEA countries). However, clade-specific vaccine effectiveness evidence is currently lacking [13,14].

Continuing elevated awareness about mpox in at-risk population groups through community engagement activities may lead to a lower risk of transmission than was observed during the multi-country outbreak in 2022-23.

Based on these elements, **the likelihood** of infection for this population with MPXV clade I is **low**.

As mentioned above, the impact of infection with this clade (morbidity and mortality) is expected to be higher than infection with MPXV clade II. However, the severity of MPXV clade I infections is expected to be reduced in those who have had a prior infection with MPXV clade IIb or vaccination with any smallpox vaccine.

Based on these elements, **the impact** of infection for this population with MPXV clade I is **low**.

Considering both likelihood and impact, **the overall risk** for MSM with multiple sexual partners in the EU/EEA from MPXV clade I is estimated to be **low**. The risk for severe disease would likely be higher for unvaccinated people or people without a prior infection with MPXV clade IIb. This would also be the case for people with underlying immunocompromising conditions and those with an untreated HIV infection (as was the case for clade IIb).

This assessment is based on historical data on MPXV clade I, on data from the ongoing epidemic in DRC, and on data from the recent MPXV II outbreak. Many elements on which this assessment is based contain an important level of uncertainty.

Recommendations for response

The ECDC recommendations for public health authorities in the EU/EEA countries remain the same [15] as for the MPXV clade IIb outbreak:

- Continue surveillance, testing, contact tracing, and sequencing of mpox cases as much as possible.
- Continue activities to increase awareness of health professionals around mpox and the appropriate management of cases.
- If feasible, offer post-exposure vaccination with the available third generation smallpox vaccine.
- Continue risk communication and strong engagement with at-risk groups, as well as the broader public.

Public health authorities should ensure effective surveillance and prompt initiation of contact tracing as needed. Each case should be thoroughly interviewed, with the collection of essential epidemiological data, such as travel history, list of contacts and type of contact, behavioral risk factors, underlying conditions, vaccination status for mpox and previous smallpox and date of last vaccination [4,16,17]. Public health authorities should continue increasing awareness among clinicians about mpox and of the possibility of circulation of clade I particularly at sexual health clinics and clinics that serve MSM, This should also be communicated to diagnostic laboratories, which are encouraged to perform molecular identification/genotyping of MPXV strains detected in the diagnostic specimens (through partial or complete genome sequence determination) as well as share virus sequences in public sequence databases (e.g. GISAID and NCBI GenBank).

Awareness should be maintained or raised among clinicians in EU/EEA Member States of the ongoing possibility of introduction and circulation of MPXV (both clades I and IIb) in the community and the recommendation to promptly test all suspect cases and inform public health authorities even before test results are available. They should also be made aware of the possibility of seeing more severe cases due to infection with clade I MPXV. Such patients, as has been observed in the outbreak of MPXV clade II, require prompt initiation of supportive and antiviral treatment and/or post exposure vaccination [4,18].

National public health authorities should report mpox cases at the EU level as follows: all mpox cases on a monthly basis to EpiPulse (TESSy) and potential detection of MPXV clade I as a new event on EpiPulse.

Close collaboration with community-based organisations that work with MSM or other groups at high risk is essential to reach target groups. Public health authorities can use guidance and good examples of risk communication and community engagement developed during the 2023 mpox outbreak and available in the ECDC mpox webpage. Key messages include awareness of symptoms, seeking testing and avoiding sex and close contacts until symptoms resolve and to seek vaccination if available [4,19]. Risk communication with the general population should include the risk of exposure to mpox through sex. Anyone presenting with symptoms compatible with mpox should be advised to seek medical care and abstain from sex and close contacts until a diagnosis is made or until symptoms resolve if infected [20]. Information around the possibility of more severe infection should be included swiftly in case infections with clade I are confirmed in Europe.

The control of the ongoing outbreak in DRC would, apart from the direct benefit for the affected population, also reduce the likelihood of geographical spread of MPXV clade I in neighboring countries and the EU/EEA. According to WHO, a clinical trial with the antiviral tecovirimat is ongoing in two hospitals in the country; there are however no immunisation programmes for populations at risk of mpox outside of research projects. Building capacity for contact tracing, diagnosis and sequencing, and vaccination are WHO priorities in DRC to support public health authorities' control efforts.

Source and date of request

ECDC internal decision, 27 November 2023, following a question from an EU Member State.

Consulted experts

ECDC experts (in alphabetic order): Agoritsa Baka, Leonidas Alexakis, Xanthi Andrianou, Sabrina Bacci, Tamas Bakonyi, Olivier Briet, Orlando Cenciarelli, Bruno Ciancio, Luca Freschi, Celine Gossner, Silvia Funke, Nina Lagerqvist, Priyanka Nannapaneni, Lina Nerlander, Emmanuel Robesyn and Gianfranco Spiteri.

Disclaimer

ECDC issues this risk assessment document based on an internal decision and in accordance with Article 10 of Decision No 1082/13/EC and Article 7(1) of Regulation (EC) No 851/2004 establishing a European centre for disease prevention and control (ECDC). In the framework of ECDC's mandate, the specific purpose of an ECDC risk assessment is to present different options on a certain matter. The responsibility on the choice of which option to pursue and which actions to take, including the adoption of mandatory rules or guidelines, lies exclusively with the EU/EEA Member States. In its activities, ECDC strives to ensure its independence, high scientific quality, transparency and efficiency.

This report was written with the coordination and assistance of an Internal Response Team at the European Centre for Disease Prevention and Control. All data published in this risk assessment are correct to the best of our knowledge at the time of publication. Maps and figures published do not represent a statement on the part of ECDC or its partners on the legal or border status of the countries and territories shown.

References

1. World Health Organization (WHO). Mpox (monkeypox)- Democratic Republic of the Congo (Disease Outbreak News). Geneva: WHO; 2023. Available at: <https://www.who.int/emergencies/disease-outbreak-news/item/2023-DON493>
2. Sciensano. Apenpokken (MPX) - Epidemiologische situatie. Brussels: Sciensano; 2023. Available at: <https://www.sciensano.be/nl/biblio/apenpokken-mpx-epidemiologische-situatie>
3. Kibungu EM, Vakaniaki EH, Kinganda-Lusamaki E, Kalonji-Mukendi T, Pukuta E, Hoff NA, et al. Clade I-Associated Mpox Cases Associated with Sexual Contact, the Democratic Republic of the Congo. *Emerging Infectious Diseases*. 2023;30(1):eid3001.231164. Available at: <https://europepmc.org/article/med/38019211>
4. European Centre for Disease Prevention and Control (ECDC). Public health considerations for mpox in EU/EEA countries. Stockholm: ECDC; 2023. Available at: <https://www.ecdc.europa.eu/en/publications-data/public-health-considerations-mpox-eueea-countries>
5. European Medicines Agency (EMA). Imvanex - Smallpox vaccine (Live Modified Vaccinia Virus Ankara). Amsterdam: EMA; 2022. Available at: <https://www.ema.europa.eu/en/medicines/human/EPAR/imvanex>
6. European Medicines Agency (EMA). EMA recommends approval of Imvanex for the prevention of monkeypox disease. Amsterdam: EMA; 2022. Available at: <https://www.ema.europa.eu/en/news/ema-recommends-approval-imvanex-prevention-monkeypox-disease>
7. Dukers-Muijters N, Evers Y, Widdershoven V, Davidovich U, Adam PC, Op de Coul EL, et al. Mpox vaccination willingness, determinants, and communication needs in gay, bisexual, and other men who have sex with men, in the context of limited vaccine availability in the Netherlands (Dutch Mpox-survey). *Frontiers in Public Health*. 2023;10:1058807. Available at: <https://www.frontiersin.org/articles/10.3389/fpubh.2022.1058807/full>
8. Reyes-Urueña J, D'Ambrosio A, Croci R, Bluemel B, Cenciarelli O, Pharris A, et al. High monkeypox vaccine acceptance among male users of smartphone-based online gay-dating apps in Europe, 30 July to 12 August 2022. *Eurosurveillance*. 2022;27(42):2200757. Available at: <https://www.eurosurveillance.org/content/10.2807/1560-7917.ES.2022.27.42.2200757>
9. Ghazy RM, Hammad EM, Hall MA, Mahboob A, Zeina S, Elbanna EH, et al. How can imported monkeypox break the borders? A rapid systematic review. *Comparative Immunology, Microbiology and Infectious Diseases*. 2023;92:101923. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9716240/>
10. Patrzylas P, Findlater L, Merrick R, Sawyer C, Crowe W, McAuley A, et al. Household mpox transmission: estimating the secondary attack rate and factors associated with transmission within households in the UK mpox outbreak between May and November 2022. 2023. In: *European Scientific Conference on Applied Infectious Disease Epidemiology (ESCAIDE)*. Barcelona: ECDC. Available at: https://www.escaide.eu/sites/default/files/documents/ESCAIDE-2023-abstract-book_1.pdf
11. European Centre for Disease Prevention and Control (ECDC). Factsheet for health professionals on mpox (monkeypox). Stockholm: ECDC; 2023. Available at: <https://www.ecdc.europa.eu/en/all-topics-z/monkeypox/factsheet-health-professionals>
12. Nigeria Centre for Disease Control and Prevention (NCDC). Update on mpox (MPX) in Nigeria. Abuja: NCDC; 2023. Available at: <https://ncdc.gov.ng/themes/common/files/sitreps/3415a319f884b661f29f54d6b4791c43.pdf>
13. Svartstein A-SW, Knudsen AD, Heidari S-L, Heftdal LD, Gelpi M, Benfield T, et al. Mpox Incidence and Vaccine Uptake in Men Who Have Sex with Men and Are Living with HIV in Denmark. *Vaccines*. 2023;11(7):1167. Available at: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC10385255/>
14. Palich R, Jędrzejewski T, Schneider L, Qatib N, Orriere T, Gosset D, et al. High uptake of vaccination against mpox in men who have sex with men (MSM) on HIV pre-exposure prophylaxis (PrEP) in Paris, France. *Sexually Transmitted Infections*. 2023;99(8):552-3. Available at: <https://sti.bmj.com/content/sextrans/early/2023/07/28/sextrans-2023-055885.full.pdf>
15. European Centre for Disease Prevention and Control (ECDC). Monkeypox multi-country outbreak - second update. Stockholm: ECDC; 2022. Available at: <https://www.ecdc.europa.eu/en/publications-data/monkeypox-multi-country-outbreak-second-update>
16. World Health Organization (WHO). Review Committee regarding Standing Recommendations for mpox. Geneva: WHO; 2023. Available at: <https://www.who.int/teams/ihr/ihr-review-committees/review-committee-regarding-standing-recommendations-for-mpox>
17. World Health Organization (WHO). Standing recommendations for mpox issued by the Director-General of the World Health Organization (WHO) in accordance with the International Health Regulations (2005) (IHR). Geneva: WHO; 2023. Available at: <https://cdn.who.int/media/docs/default-source/documents/ihr/mpox-standing-recommendations-082023.pdf>

18. European Centre for Disease Prevention and Control (ECDC). Considerations for contact tracing during the monkeypox outbreak in Europe, 2022. Stockholm: ECDC; 2022. Available at: <https://www.ecdc.europa.eu/en/publications-data/considerations-contact-tracing-during-monkeypox-outbreak-europe-2022>
19. European Centre for Disease Prevention and Control (ECDC). Risk communication and community engagement (RCCE) resources for mpox (monkeypox). Stockholm: ECDC; 2023. Available at: <https://www.ecdc.europa.eu/en/infectious-disease-topics/z-disease-list/monkeypox/monkeypox-multi-country-outbreak/risk-communication>
20. European Centre for Disease Prevention and Control (ECDC). Graphics on mpox (monkeypox). Stockholm: ECDC; 2023. Available at: <https://www.ecdc.europa.eu/en/monkeypox/graphics>