

## Review Article

# Is Mpox (Monkey pox) a Public Health issue?

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## Abstract

Mpox (Monkeypox) in humans is a zoonotic disease that results in smallpox like symptoms. The monkeypox virus (MPXV) was first identified in 1958 in monkeys imported from Singapore and kept for research in Denmark when two outbreaks of a pox-like disease occurred among monkeys kept for research. The first human case of mpox was recorded in 1970, currently from 2022, mpox spread around the world. Before that, cases of mpox in other places were rare and generally due to travel or to importation of animals from regions where mpox is endemic. WHO declared it a Public Health Emergency of International Concern (PHEIC), following the International Health Regulations Emergency Committee meeting on the 14th of August 2024. The objective of this review article is to provide an up-to-date, precise, and timely overview of Mpox (monkeypox), a severe communicable viral disease. This article of review also intended to provide an up-to-date epidemiology for Mpox. Since the elimination of smallpox, MPXV (The monkeypox) virus is one of the most virulent poxvirus for humans. It was mainly a disease mainly of central and west Africa, spreading throughout the globe since last few years. A better understanding of Mpox's dynamic of transmission and epidemiology is needed to contain and eliminate through increased surveillance and identification of cases.

**Key words: Mpox, Zoonotic disease, Public Health Emergency of International Concern (PHEIC)**

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## Introduction:

The monkeypox virus (MPXV) was first identified in 1958 in monkeys imported from Singapore and kept for research in Denmark when two outbreaks of a pox-like disease occurred among monkeys kept for research. MPXV in humans appears to have originated in parts of Africa, where hunting forest animals and preparation of wild game (bush meat) are considered sources of exposure. Monkey pox was recognized as a distinct human disease in 1970 during smallpox eradication efforts in the Democratic Republic of Congo (DRC) when its continued presence was confirmed in rural, forested areas.<sup>1,2</sup>

In non-endemic regions, the transmission of mpox is short-lived and generally contained within a defined geographic area. The increased prevalence of mpox in humans has been linked to an increase in changing of viral fitness traits and lower vaccine immunity, making it a significant emerging human threat since the 1980s.<sup>3</sup>

The source of the disease remains unknown although named "monkeypox" originally, monkeys are not the genuine reservoir of MPXV. Several animals can naturally or experimentally be infected with Mokey Pox Virus, but the natural host reservoir remains elusive.<sup>4,5</sup>

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More than one hundred thousand confirmed mpox cases have been reported to WHO continues to circulate at low levels globally since the start of the global mpox outbreak in 2022. WHO declared it a Public Health Emergency of International Concern (PHEIC), following the International Health Regulations Emergency Committee meeting on the 14th of August 2024. The disease, which causes fever, muscle aches and boil-like skin lesions, has been spreading rapidly since May 2022, when it first came onto the global radar with an outbreak of cases in the UK, outside of normally endemic countries in Africa. In May 2022, there were 3,040 cases from 47 countries; in July 2022, when WHO declared it a public health emergency, there were 14,533 cases from 72 countries. Now, a year later in May 2023, 140 deaths and more than 87,000 cases have been reported to WHO from 111 countries.<sup>7,8</sup>

Aside from the direct health impact of human infection, the monkeypox virus holds significant public health

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importance given its clinical similarity to smallpox in both human and animal populations.<sup>9</sup>

Animal-to-human transmission occurs via bites and scratches from infected animals. Preparation and handling of infected animal products (bushmeat) may also result in transmission. The definitive monkeypox virus reservoir in animal has not been identified. The virus was isolated from several mammals, small animal species and nonhuman primates. Pox-like lesions were found in the animals with monkeypox, but asymptomatic carriers yet not detected.<sup>10</sup>

Dr. Tedros Adhanom Ghebreyesus, Director-General, WHO has declared the increasing trend of mpox in the Democratic Republic of the Congo (DRC) and a growing number of affected countries in Africa constitutes a public health emergency of international concern (PHEIC) under the International Health Regulations (2005) (IHR).<sup>11</sup>

### Epidemiology and disease dynamics

Mpox (monkeypox) is a zoonotic disease, caused by *Monkeypox virus*, a species of the genus *Orthopoxvirus* in the *Poxviridae* family, which includes variola, cowpox, vaccinia and other viruses.<sup>12</sup>

There are two distinct clades of the virus viz clade I (subclades Ia and Ib) and clade II (subclades IIa and IIb). A global outbreak of mpox was caused in 2022–2023 by the clade IIb strain. It is endemic in parts of Central and West Africa. Small rodents like monkeys, and other mammals that live in these areas are the carriers of the virus.

**Clade I** is responsible for the current increase in cases in Central and Eastern Africa. Generally, higher numbers of severe illnesses are caused due to clade I than clade II, with up to 10% of death rate. Recent outbreaks have lower death rates of about 1-3.3%. **Clade II** is the type that caused the global outbreak that began in 2022. Infections from clade II mpox are generally less severe and death rate is only 0.01%. Clade II is endemic to West Africa.<sup>13</sup>

Close contact including intimate contact, direct contact with contaminated materials, direct contact with infected animals are found to be mode of transmission of **both types of the virus**.<sup>14</sup>

Its epidemiology has changed in the last few years. Demographics and other personal characteristics attached to this outbreak revealed 99% of cases were reported in men who have sex with other men. This was not the case in previous outbreaks of the virus and is a clear - cut example of new modes of transmission we understand little about. Therefore, there could be a risk of transmission in other populations. The risk the virus poses to vulnerable groups, including women and children, cannot be predicted.<sup>15</sup>

Close contact includes skin-to-skin (such as touching or sex) and mouth-to-mouth or mouth-to-skin contact (such as kissing), and it can also include face-to-face talking or breathing, which can generate infectious droplets, with someone who has mpox. People with multiple sexual partners are at higher risk. Contaminated clothing or linen, needle injuries in health care, tattoo parlours can be the source of infection.<sup>16</sup>

During pregnancy or child birth, vertical transmission may occur; the limited available data suggest that mpox increases the risks of severe maternal disease, miscarriage, and stillbirth. A 2024 systematic review of seven studies identified 32 pregnant women with clade IIb MPXV infection between 6 and 31 weeks of gestation.<sup>17</sup>

Animal-to-human transmission of mpox occurs from infected animals to humans from bites or scratches, or during hunting, skinning, trapping, cooking, playing with alive or dead animals or eating meat of infected animals. But the animal reservoir of the monkeypox virus remains obscure and further studies are underway.<sup>18</sup>

Most of the cases that were reported in the multi-country outbreak in 2022/2023 were identified among gay, bisexual and other men who have sex with men (96% of all cases). Given that the virus moves from person to person in these sexual networks in many countries, gay, bisexual and other men who have sex with men may be at higher risk of being exposed if they have sex or other form of close contact with someone who is infectious. People who have multiple or new sexual partners are most at risk.<sup>19,20</sup>

In African countries the most common mode of transmission is direct contact with rashes, scabs or body fluids of a person with mpox, extended close contact (more than four hours) with respiratory droplets from an infected person - includes sexual contact, clothes, sheets, blankets or other materials that have been in contact with rashes or body fluids of an infected person; transplacental transmission of the virus to a fetus is also a potential route of transmission.<sup>21</sup>

Study findings strengthens evidence of skin-to-skin contact during sex as the dominant mechanism of transmission of monkeypox, with important implications for disease control.<sup>22</sup>

Present day understanding of how long immunity following mpox lasts continues to evolve. There have been some cases of second infections reported. A few people may get mpox despite having had it before.<sup>23</sup>

Contracting mpox during pregnancy (a relative immunosuppressed state) is always dangerous and can lead to loss of the pregnancy, stillbirth, death of the newborn, or complications for the parent.<sup>24</sup>

Mpox usually occurs in Central and West Africa. Cases outside of Africa are often due to International travel and Imported animals.<sup>25</sup>

Incubation period of Mpox (Monkey Pox) varies from 3-17 days (average 7 – 14 days).<sup>26</sup> Typically symptoms last 2 to 4 weeks but may last longer in someone with a compromised immune system. Rash, fever, sore throat, headache, muscle aches, back pain, weakness, enlarged lymph nodes are the common symptoms of mpox. The first symptom of mpox is a rash in some cases, but others may have fever, muscle aches or sore throat first.<sup>27</sup>

An initial febrile prodrome is accompanied by generalized headache and fatigue. Rash develops along with the presence of maxillary, cervical, or inguinal lymphadenopathy (1to 4 cm in diameter) in many patients. Lymphadenopathy is not characteristic of smallpox, while enlarged there is enlarged lymph nodes in mpox and are firm, tender, and sometimes painful. The presence of lymphadenopathy may be an indication that there is a more effective immune recognition and response to infection by monkeypox virus vs variola virus.<sup>28</sup>

Through an integrated plan, WHO supports coordination between countries and stakeholders for responsive public health action, monitor and share information, collective intelligence about how the outbreak is evolving, foster communication and engage communities to adopt protective measures and ensure safe and quality clinical care including infection prevention and control.<sup>29</sup>

Generalized poxvirus infections progress in a stepwise manner (with an initial amplification of viral load in the lymph nodes, liver, and spleen), resulting in a high-grade viraemia that leads to disseminated infection of the skin and respiratory tract, and the excretion of infective respiratory droplets.<sup>30</sup>

A **38-year-old man** from **Kerala** has been confirmed as **India's** latest case of **monkeypox**, specifically infected with the **Mpox clade 1b strain**, following his return from the **United Arab Emirates**.

## Prevention and control

The mpox outbreak can be controlled and can be stopped.

Monkeypox infection does not normally produce a carrier state or latent infection as a characteristic of *Orthopoxviruses*. Monkeypox has a wide host range unlike most other poxviruses. It is endemic in some wild populations whose geographic ranges increasingly overlap with encroaching human populations, many of which have increasingly high numbers of immunocompromised individuals. These factors increase the potential for human transmission. Within human populations, infections occur in small clusters, not larger outbreaks as is typical with smallpox. Smallpox vaccination provides partial and limited-

term protection against the development and severity of monkeypox disease in both humans and nonhuman primates.<sup>31</sup>

The current outbreak is exposing gaps in our knowledge of MPX, and clinicians and public health workers should be aware of the atypical manifestations of the disease, for example, in some cases, both the absence of prodromal symptoms and the presence of herald skin lesions only at the point of sexual contact were observed suggesting human-to-human transmission in sexual networks plays a key role in the current outbreak.<sup>32</sup>

As the clinical manifestations of monkeypox are difficult to differentiate from other *orthopoxviruses*-caused diseases, rapid diagnosis is extremely important in controlling actual outbreaks. Real-time PCR on suspected skin lesions is the method of choice for routine diagnosis.<sup>33</sup> s the viraemia lasts for shorter duration, scabs, swabs, and aspirated lesion fluid are preferred. Viral isolation and culture and immunochemistry analysis may be required for definitive diagnosis, and immunofluorescence imaging may be used for monkeypox antigen detection.<sup>34</sup>

In the recent months, cases of clade 1b have been reported in DRC, Burundi, Kenya, Rwanda and Uganda, Thailand and Sweden. The government of India on confirmed cases of Monkeypox (Mpox) in India in August 2024 and case of the Mpox virus has been verified as a travel-related infection.<sup>35</sup>

Through coordinated global, regional, and national efforts to stop outbreaks of human-to-human transmission of mpox, WHO and partners have developed a Global Mpox Strategic Preparedness and Response Plan. The plan focuses on advancing research and equitable access to medical countermeasures; response strategies and implementing comprehensive surveillance; minimizing zoonotic transmission; and empowering communities to actively participate in outbreak prevention and control.<sup>36</sup>

The emphasis on strategic leadership, timely evidence-based guidance, and access to medical countermeasures for the most at-risk groups in affected countries are advocated at the global-level.

Country's approach must adhere to the principles of equity, global solidarity, community empowerment, human rights, and coordination across sectors and this complex outbreak requires a comprehensive and coordinated international response along with all global health actions.

Continuing expansion of equitable access to diagnostics and vaccines is necessary to achieve and sustain elimination of human- to-human mpox transmission. The focus on human-to-human spread of Mpox reflects a new appreciation of its importance in all contexts; develop and implement public health strategies to detect and stop outbreaks, including behavioural interventions and vaccination.<sup>37</sup>

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### Guiding principles of mpox prevention<sup>38</sup>

Work towards these objectives is underpinned and informed by four guiding principles.

- **Community leadership**  
Mpox programmes and services are guided by well-resourced and robust community engagement and leadership.
- **Equity and human rights**  
All people at risk of exposure to mpox have equitable access to stigma-free, non-discriminatory, safe and confidential services, within a continuing global effort to expand access to WHO-recommended tests, treatments and vaccines.
- **Context-specific collaboration and integration**  
Based on the epidemiology, preferences, needs and capacities of affected communities, mpox surveillance, prevention, diagnosis, treatment and care are integrated with existing programmes and services in health and congregate settings, including community-based services and close coordination with One Health programmes and stakeholders.
- **Commitment to continuous learning**  
Stakeholders ensure findings from ongoing evaluation and applied research are used to enhance programmes and improve outcomes for all patients and communities.

### Conclusion

The best control and containment strategy would be to implement large scale community education programs to reduce the risk of zoonotic spillover in at risk populations. By improving the knowledge and safety of these people, we would hope to limit the number of human cases occurring and reduce subsequent human to human transmissions in order to prevent further viral adaptation and to protect humans both in and outside Central Africa.

The response must be not only multifaceted but also adapted to each context because the epidemic is spreading in diverse areas. Pending the arrival of vaccines, as many partners as possible must support other key aspects of the response such as laboratory analysis, surveillance, support for isolation and self-isolation, awareness-raising, etc. and of course, patient care.

### References:

1. Foster, S. O. *et al.* Human monkeypox. *Bull World Health Organ* 46, 569Y576(1972).
2. World Health Organization. The current status of human monkeypox: Memorandum from a WHO meeting. *Bull World Health Organ* 62, 703Y713 (1984)

3. Banuet-Martinez M, Yang Y, Jafari B, Kaur A, Butt ZA, Chen HH, Yanushkevich S, Moyles IR, Heffernan JM and Korosec CS (2023). Monkeypox: a review of epidemiological modelling studies and how modelling has led to mechanistic insight. *Epidemiology and Infection*, 151, e121, 1–16. Available from: <https://doi.org/10.1017/S0950268823000791>
4. Available from: [https://www.cdc.gov/poxvirus/mpox/about/index.html#:~:text=Mpox%20\(formerly%20known%20as%20monkeypox,%20including%20scabs%20before%20healing.](https://www.cdc.gov/poxvirus/mpox/about/index.html#:~:text=Mpox%20(formerly%20known%20as%20monkeypox,%20including%20scabs%20before%20healing.)
5. Alakunle E, Kolawole D, Diaz-Ca' nova D, Alele F, Adegboye O, Moens U and Okeke MI (2024) A comprehensive review of monkeypox virus and mpox characteristics. *Front. Cell. Infect. Microbiol.* 14:1360586. doi: 10.3389/fcimb.2024.1360586
6. Mpox: background information. Available from: <https://www.gov.uk/guidance/monkeypox#:~:text=Mpox%20was%20first%20discovered%20in,a%20number%20of%20African%20countries.>
7. Jeyaraman M, Selvaraj P, Halesh MB, Jeyaraman N, Nallakumarasamy A, Gupta M, Maffulli N, and Gupta A. Monkeypox: An Emerging Global Public Health Emergency; *Life* 2022, 12(10), 1590; <https://doi.org/10.3390/life12101590>
8. GAVI. [https://www.gavi.org/vaccineswork/mpox-no-longer-officially-public-health-emergency-heres-why-we-shouldnt-let-down?gad\\_source=1&gclid=Cj0KCQjw8-2BhCHARIsAF\\_wIgy2Cazu7V-EvWi5PQN17d5T0\\_AO-gNNooLwERP4OQJLBR6An5rg7rIaAopcEALw\\_wcB](https://www.gavi.org/vaccineswork/mpox-no-longer-officially-public-health-emergency-heres-why-we-shouldnt-let-down?gad_source=1&gclid=Cj0KCQjw8-2BhCHARIsAF_wIgy2Cazu7V-EvWi5PQN17d5T0_AO-gNNooLwERP4OQJLBR6An5rg7rIaAopcEALw_wcB)
9. Parker, S., Nuara, A., Buller, R.M.L., Schultz, D.A., 2007. Human monkeypox: an emerging zoonotic disease. *Future Microbiol.* 2, 17–34
10. Titanji BK, Tegomoh B, Nematollahi S, Konomos M, and Kulkarni PA. Monkeypox: A Contemporary Review for Healthcare Professionals
11. Available from: <https://www.who.int/news/item/14-08-2024-who-director-general-declares-mpox-outbreak-a-public-health-emergency-of-international-concern>
12. Available from: <https://www.who.int/news-room/fact-sheets/detail/mpox>
13. Available from: <https://www.cdc.gov/mpox/about/index.html#:~:text=There%20are%20two%20types%20of,of%20about%201%2D3.3%25.>
14. Available from: <https://www.cdc.gov/poxvirus/mpox/about/index.html#:~:text=Mpox>
15. Emmanuel Lamptey. Weighing in on monkeypox against the criteria of public health emergency, *Global Health Journal*; (2023),7: 117–119
16. Available from: <https://www.who.int/news->

- room/fact-sheets/detail/mpox#:~:text=People%20with%20multiple%20sexual%20partners,be%20passed%20to%20the%20baby.
17. Nachega JB et al. Mpox in Pregnancy — Risks, Vertical Transmission, Prevention, and Treatment, *The New England Journal of Medicine*. Available from: <https://www.nejm.org/doi/pdf/10.1056/NEJMp2410045>
  18. He Y, Tang Y, Wang C, Zhou Z, Li W, Tian M. The Global Health Threat of Monkeypox Virus: Understanding Its Biology, Transmission, and Potential Therapeutic Interventions. *Infect Drug Resist*. 2023 Dec 21;16:7759-7766. doi: 10.2147/IDR.S438725. PMID: 38146310; PMCID: PMC10749784.
  19. Low N, Bachmann LH, Ogoina D, McDonald R, Ipekci AM, Quilter LAS, Cevik M. Mpox virus and transmission through sexual contact: Defining the research agenda. *PLoS Med*. 2023 Jan 17;20(1):e1004163. doi: 10.1371/journal.pmed.1004163. PMID: 36649325; PMCID: PMC9888714.
  20. Epidemiological summary report: 2022-2023 mpox outbreak in Canada. Available from: <https://www.canada.ca/en/public-health/services/publications/diseases-conditions/epidemiological-summary-report-2022-23-mpox-outbreak-canada.html>
  21. Monkeypox: What is it and how can it be prevented? Available from: URL: <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/expert-answers/monkeypox-faq/faq-20533608>
  22. Tarín-Vicente E J. Clinical presentation and virological assessment of confirmed human monkeypox virus cases in Spain: a prospective observational cohort study, *Lancet* 2022; 400: 661–669
  23. Hazra A, Zucker J, Bell E, Flores J, Gordon L, Mitjà O et al. Mpox in people with past infection or a complete vaccination course: a global case series, *Lancet Infect Dis* 2024; 24: 57–64
  24. Dashraath P, Nielsen-Saines K, Rimoin A, Mattar CNZ, Panchaud A, Baud D. Monkeypox in pregnancy: virology, clinical presentation, and obstetric management. *Am J Obstet Gynecol*. 2022 Dec;227(6):849-861.e7. doi: 10.1016/j.ajog.2022.08.017. Epub 2022 Aug 17. PMID: 35985514; PMCID: PMC9534101.
  25. Monkeypox: What is it and how can it be prevented? Available from: URL: <https://www.mayoclinic.org/diseases-conditions/infectious-diseases/expert-answers/monkeypox-faq/faq-20533608>
  26. Center for Disease Control (CDC), Atlanta, USA. Mpox. Clinical Recognition. Available from: URL: <https://www.cdc.gov/poxvirus/mpox/clinicians/clinical-recognition>.
  27. Mpox. <https://www.who.int/news-room/fact-sheets/detail/mpox>
  28. Andrea M. McCollum and Inger K. Damon. Human Monkeypox, *Clinical Infectious Diseases* 2014;58(2):260–267
  29. Available from: [https://reliefweb.int/report/world/who-emergency-appeal-monkeypox-july-2022-june-2023?gad\\_source=1&gclid=Cj0KCQjw8--2BhCHARIsAF\\_1gzcZvR03b9PNiePKczggHGqGMWOn4PXOq9WKkXj81DM\\_mWUIPkSrzoaAjONEALw\\_wcB](https://reliefweb.int/report/world/who-emergency-appeal-monkeypox-july-2022-june-2023?gad_source=1&gclid=Cj0KCQjw8--2BhCHARIsAF_1gzcZvR03b9PNiePKczggHGqGMWOn4PXOq9WKkXj81DM_mWUIPkSrzoaAjONEALw_wcB)
  30. Tarín-Vicente E J. Clinical presentation and virological assessment of confirmed human monkeypox virus cases in Spain: a prospective observational cohort study, *Lancet* 2022; 400: 661–669
  31. Parker, S., Nuara, A., Buller, R.M.L., Schultz, D.A., 2007. Human monkeypox: an emerging zoonotic disease. *Future Microbiol*. 2, 17–34
  32. Antinori A, Mazzotta V, Vita S, Carletti F, Tacconi D, Lapini LE, D’Abramo A, Cicalini S, Lapa D, Pittalis S et al. Epidemiological, Clinical and Virological Characteristics of Four Cases of Monkeypox Support Transmission through Sexual Contact, Italy, May 2022. *Eurosurveillance* 2022, 27, 2200421.
  33. ECDC Factsheet for Health Professionals on Monkeypox. Available online: <https://www.ecdc.europa.eu/en/all-topics-z/monkeypox/factsheet-health-professionals>
  34. Yinka-Ogunleye A, Aruna O, Ogoina D, Aworabhi N, Eteng W, Badaru S, Mohammed A, Agenyi J, Etebu, EN, Numbere, T.-W.; et al. Reemergence of Human Monkeypox in Nigeria, 2017. *Emerg. Infect. Dis*. 2018, 24, 1149–1151.
  35. Available from: [https://economictimes.indiatimes.com/news/india/centre-confirms-first-mpox-case-in-india-says-no-widespread-risk/articleshow/113204281.cms?utm\\_source=contentofinterest&utm\\_medium=text&utm\\_campaign=cppst](https://economictimes.indiatimes.com/news/india/centre-confirms-first-mpox-case-in-india-says-no-widespread-risk/articleshow/113204281.cms?utm_source=contentofinterest&utm_medium=text&utm_campaign=cppst)
  36. Global strategic preparedness and response plan launched by WHO to contain mpox outbreak. Available from: <https://www.who.int/news/item/26-08-2024-global-strategic-preparedness-and-response-plan-launched-by-who-to-contain-mpox-outbreak>
  37. WHO Director-General’s opening remarks at Member States information session on mpox – 23 August 2024. Available from: <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-member-states-information-session-on-mpox-23-august-2024>
  38. WHO. Strategic framework for enhancing prevention and control of mpox, 2024–2027. Geneva: World Health Organization; 2024. Available from: URL: <https://www.who.int/publications/item/9789240092907#:~:text=Overview,countermeasures%2C%20and%20minimize%20zoonotic%20transmission.>