Mpox and viral co-infections in children: what do we know and what do we do?

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Objectives

Understand	Understand clinical and epidemiologic vulnerabilities to mpox for children
Summarize	Summarize the major viral coinfections, their clinical impact on mpox in children, and best practices for management
Outline	Outline gaps and limitations in surveillance and research on mpox and mpox coinfection among children in endemic and non-endemic settings

Epidemiology of Mpox in Children

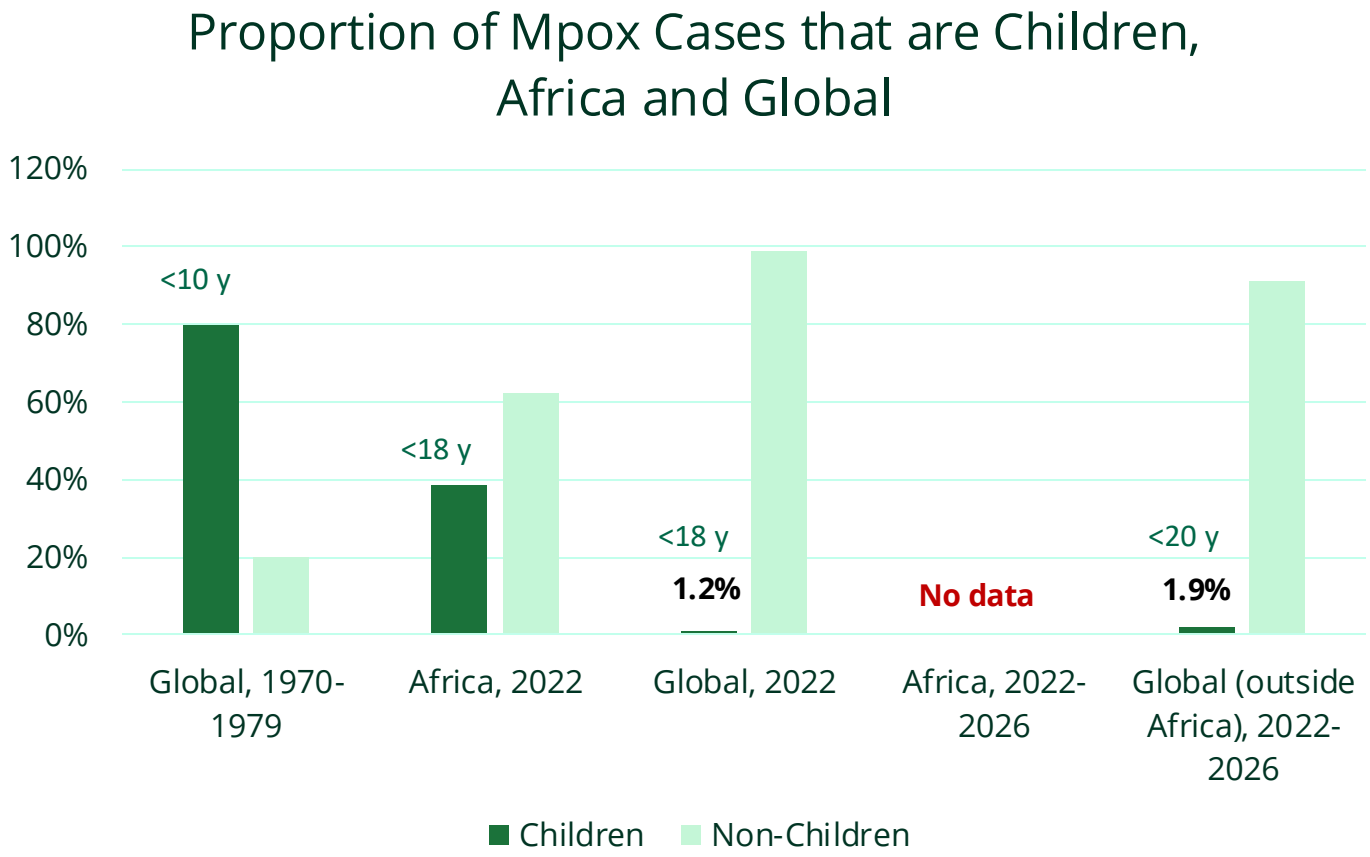
Endemic mpox has historically disproportionately affected children

- Children in African countries have been significantly affected
  - 1970: First ever reported human mpox case was in a 9-month-old in DR Congo
  - First reported case in Nigeria was also in a child (1971, 4 yr old)
  - Between 1970 and 1980, 80% of the 45 cases reported to WHO (all from West Central Africa) were in children <10 years
  - The WHO recommended active surveillance for mpox in 1979, but mpox was underreported until it began emerging outside Africa.

REVIEW

Current Opinion **A global update of mpox (monkeypox) in children**

Nadia A. Sam-Agudu[a,b,c,d], Charles Martyn-Dickens[e] and Atana U. Ewa[f]



WHO Global Mpox Trends. worldhealthorg.shinyapps.io/mpx_global

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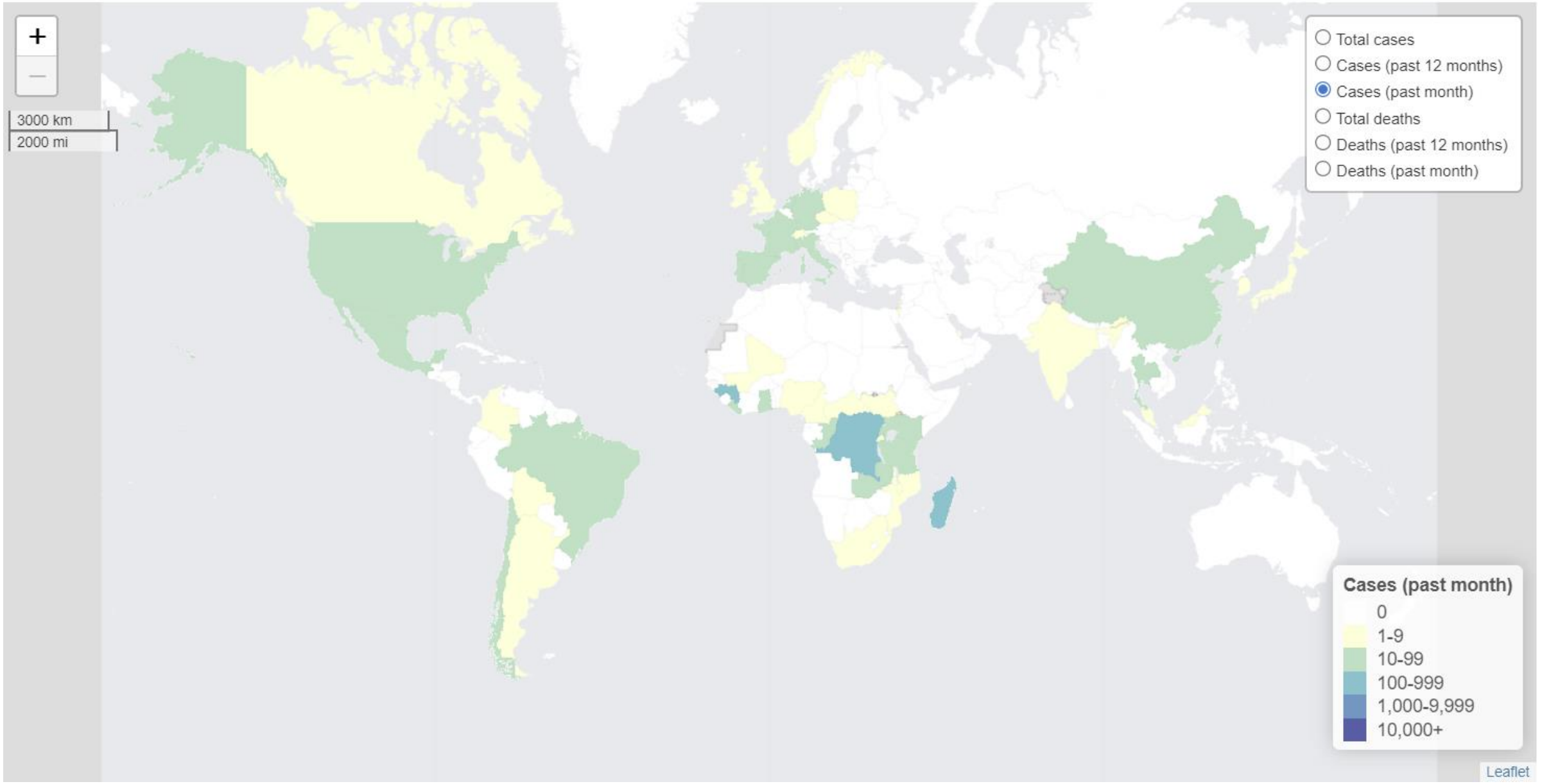
MPXV clades and epidemiology

Clade	Geographic Origin	Outside Africa	Virulence and case fatality ratio *(worse across board if child or immunocompromised)*	Transmission Mode	Major Affected Populations
Clade 1a	Central Africa (DR Congo)	Largely linked to travel	High. CFR recently 3-4%; historically up to 10%	Zoonotic spillover, household contact	**Children**, rural communities
Clade 1b	Eastern DRC	Significant geographic spread	Moderate; ~0.5%	Sustained human-to-human, sexual transmission	Adults, sex workers, urban populations; non-endemic areas for Clade 1a in DRC and neighboring countries
Clade 2a	West Africa	Limited	Low; <1%	Historically detected in animals only; Limited human-to-human spread but increasing in W. Africa	General population
Clade 2b	West Africa (Nigeria)	Global 2022 outbreak (in past month, USA, Brazil, W Europe, China)	Very Low (CFR 0.1-0.2%)	Extended sustained circulation in humans; Intimate contact	Men who have sex with men, immunocompromised individuals



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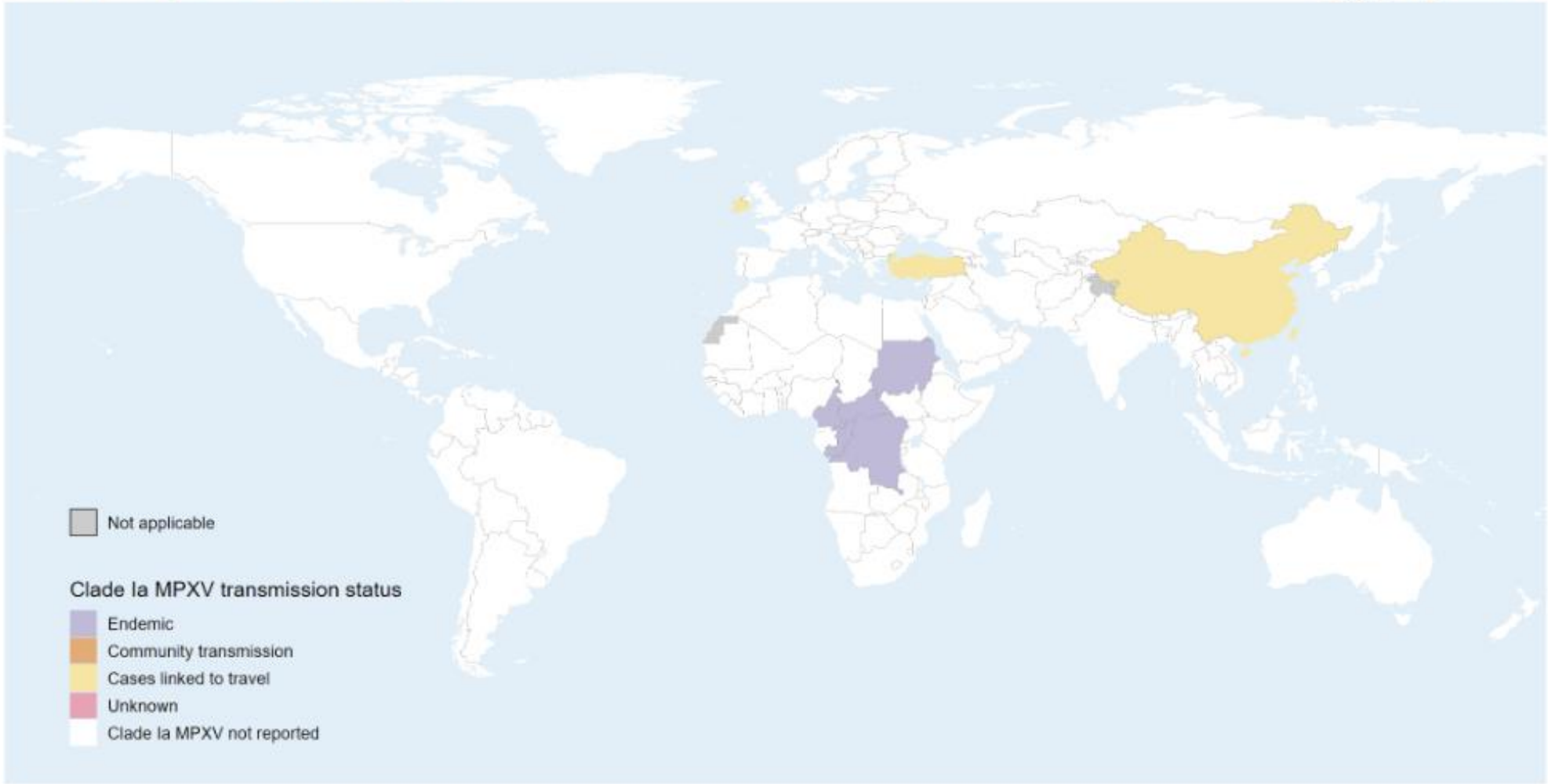
Global transmission status of clade Ia MPXV

From 1 January 2022 to 22 February 2026

World Health Organization



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Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

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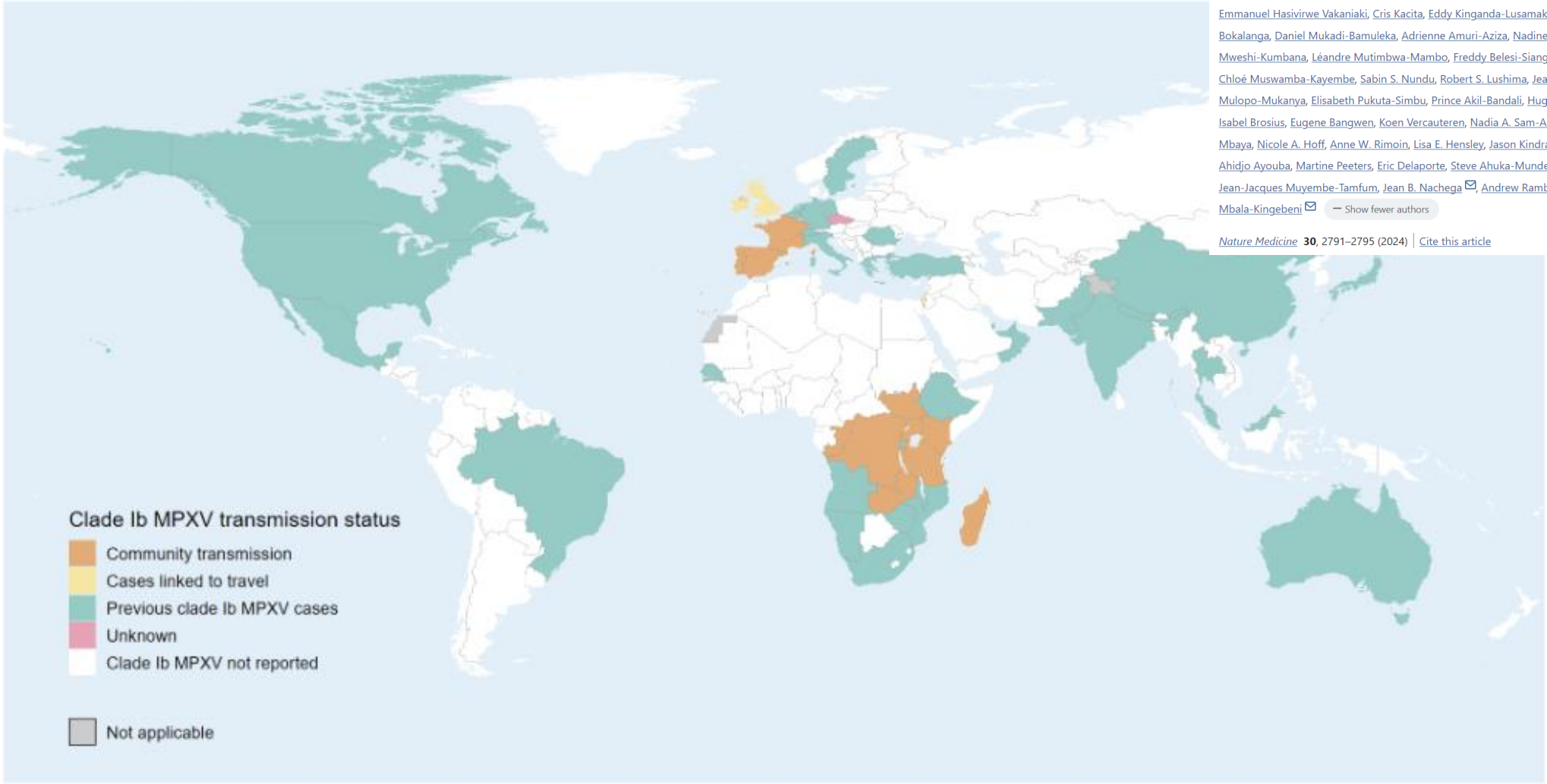
Global transmission status of clade Ib MPXV

As of 25 February 2026



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Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

Brief Communication | Open access | Published: 13 June 2024

Sustained human outbreak of a new MPXV clade I lineage in eastern Democratic Republic of the Congo

Emmanuel Hasivirwe Vakaniaki, Cris Kacita, Eddy Kinganda-Lusamaki, Áine O'Toole, Tony Wawina-Bokalanga, Daniel Mukadi-Bamuleka, Adrienne Amuri-Aziza, Nadine Malyamungu-Bubala, Franklin Mweshi-Kumbana, Léandre Mutimbwa-Mambo, Freddy Belesi-Siangoli, Yves Mujula, Edyth Parker, Pauline-Chloé Muswamba-Kayembe, Sabin S. Nundu, Robert S. Lushima, Jean-Claude Makangara-Cigolo, Noella Mulopo-Mukanya, Elisabeth Pukuta-Simbu, Prince Akil-Bandali, Hugo Kavunga, Ombotimbe Abdramane, Isabel Brosius, Eugene Bangwen, Koen Vercauteren, Nadia A. Sam-Agudu, Edward J. Mills, Olivier Tshiani-Mbaya, Nicole A. Hoff, Anne W. Rimoin, Lisa E. Hensley, Jason Kindrachuk, Cheryl Baxter, Tulio de Oliveira, Ahidjo Ayouba, Martine Peeters, Eric Delaporte, Steve Ahuka-Mundeke, Emma L. Mohr, Nancy J. Sullivan, Jean-Jacques Muyembe-Tamfum, Jean B. Nachega, Andrew Rambaut, Laurens Liesenborghs & Placide Mbala-Kingebeni
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Nature Medicine **30**, 2791–2795 (2024) | Cite this article

Clinical Manifestations of, and Vulnerability to Mpox in Children

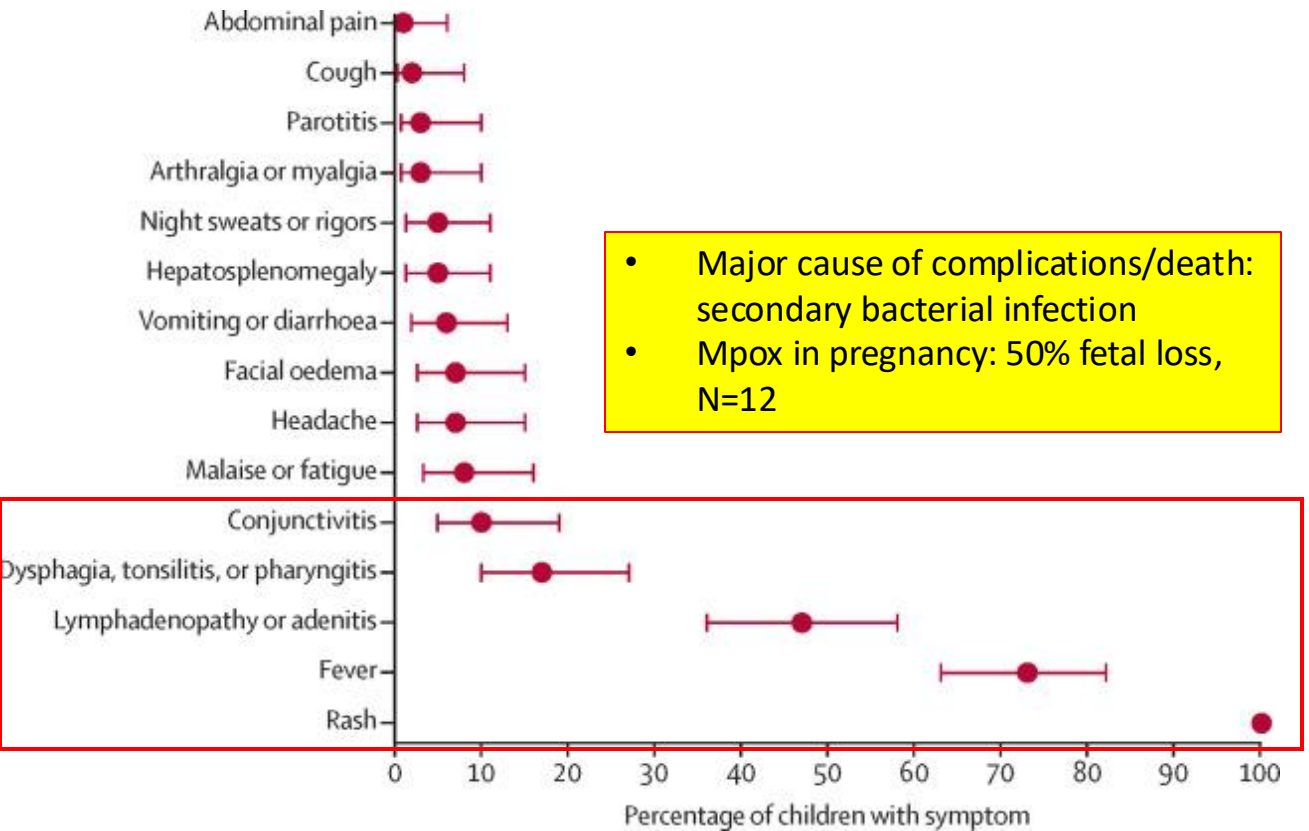
Top clinical features of mpox in children vs adults

THE LANCET
Global Health

ARTICLES · Volume 12, Issue 4, E572-E588, April 2024 · *Open Access* Download Full Issue

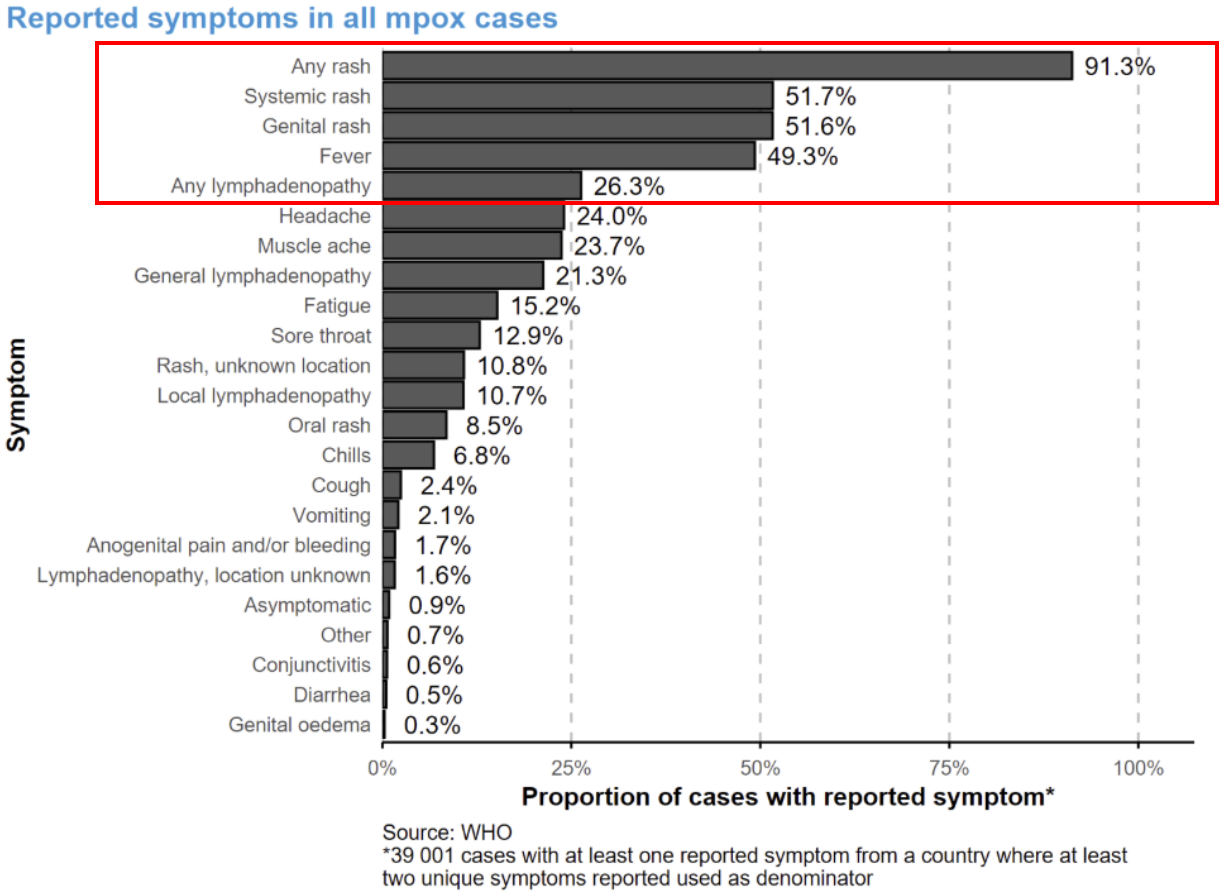
Paediatric, maternal, and congenital mpox: a systematic review and meta-analysis

Nuria Sanchez Clemente, PhD [a,b] · Charlotte Coles, MSc [a] · Enny S Paixao, PhD [b] · Prof Elizabeth B Brickley, PhD [b] · Elizabeth Whittaker, PhD [c,d] · Tobias Alfven, PhD [g,h] · et al. Show more



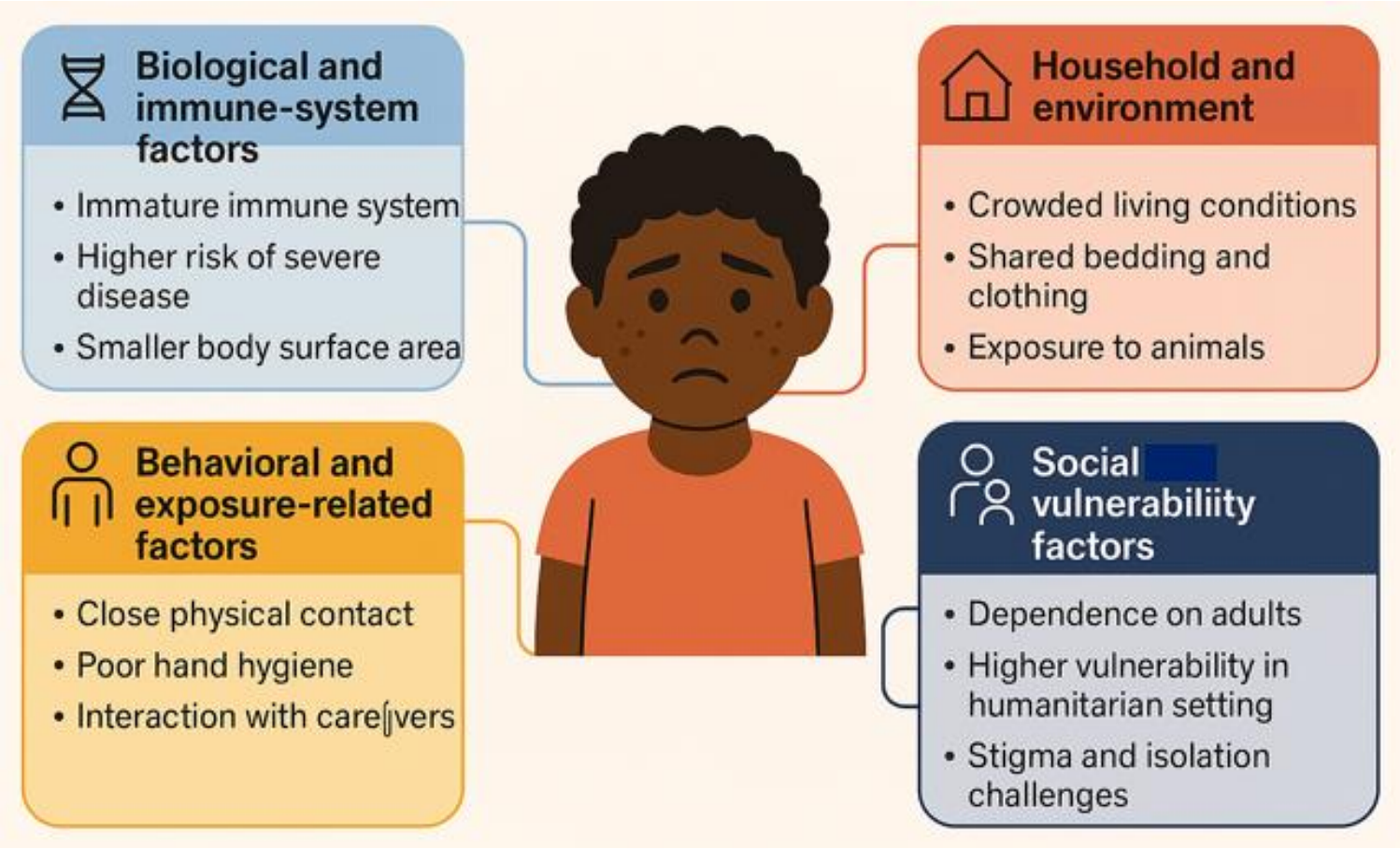
- Major cause of complications/death: secondary bacterial infection
- Mpox in pregnancy: 50% fetal loss, N=12

WHO symptomatology chart: all cases, all ages with available data from Jan 2022 to Feb 2026



Source: WHO
*39 001 cases with at least one reported symptom from a country where at least two unique symptoms reported used as denominator

Why are children more susceptible to MPXV infection (and death?)



Other considerations:

- Lack of protection from smallpox vaccine- discontinued in 1980
- MPXV subtype/clade, ie geography

- **Comorbidities:**
  - Malnutrition
  - Cancer
- **Co-infections? (concern for synergistic co-infection)**
  - HIV
  - Measles virus (rubeola)
  - Varicella zoster virus (chickenpox)

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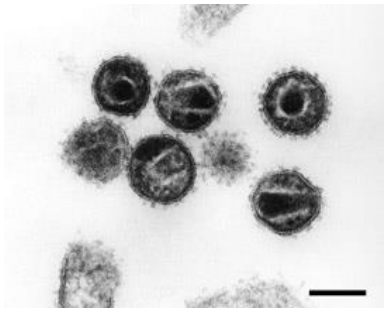
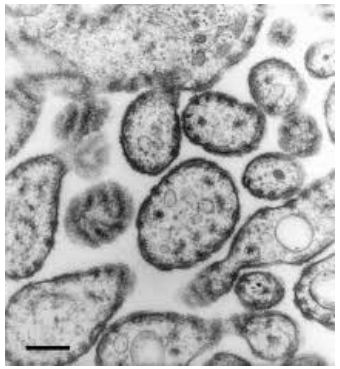
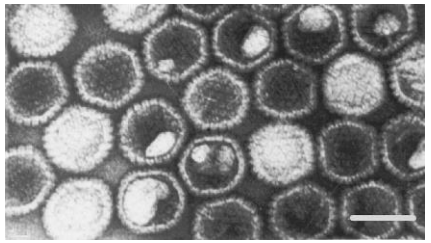
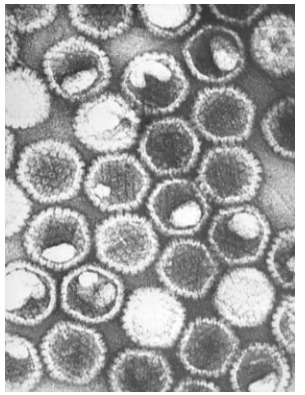
Major Viral Coinfections with Mpox in Children

Viral coinfections: Mpox et al









Mpox (DNA virus)	HIV (RNA virus)	Measles/Rubeola (RNA virus)	Varicella zoster virus (DNA virus)	Herpes simplex virus (DNA virus)
Realm *Varidnaviria*	**Realm** *Riboviria*	**Realm** *Riboviria*	**Realm** *Duplodnaviria*	**Realm** *Duplodnaviria*
Family *Poxviridae*	**Family** *Retroviridae*	**Family** *Paramyxoviridae*	**Family** *Orthoherpesviridae*	**Family** *Orthoherpesviridae*
Genus *Orthopoxvirus*	**Genus** *Lentivirus*	**Genus** *Morbillivirus*	**Genus** *Varicellovirus*	**Genus** *Simplexvirus*
Species *Monkeypox virus*	**Species** *Human immunodeficiency virus*	**Species** *Morbillivirus hominis*	**Species** *Human alphaherpesvirus 3*	**Species** *Human alphaherpesvirus 1 and 2*

What do we know about mpox and viral coinfections in children?

	Notable publications	Data type	Geography and population	Management	Clinical Complications
Mpox and HIV Worldwide co-infection, all ages: 51% with HIV; increased risk of hospitalization, worse mpox presentation, clinical outcomes	Yinka-Ogunleye et al, 2023	National case control study, Nigeria 2017-2019 outbreak	28% of 86 people with mpox had HIV; 1 of 24 children (4.1%) under 15 y Mortality adult mpox cases: 6.2%; with HIV-22% Mortality ped mpox cases: 50%; with HIV-100% (Neonate, Poorly treated HIV, Encephalitis presentation)	Not reported	Encephalitis and death
Mpox and HIV	Hoxha et al, 2023	Multicountry surveillance study among case-patients <18 yrs; 111 countries; Jan 2022-May 2023	1.3% of 84,614 cases were <18 y 62% Americas; 30% Africa; 8% Europe 11 (1%) of 1,118 children with mpox had HIV; 30% HIV neg; 69% unknown	Not reported	Not reported
Mpox and Measles					

What do we know about mpox and viral coinfections in children?

	Notable publications	Data type	Geography and population	Management	Clinical Complications
Mpox and VZV	Hughes et al, 2020	Surveillance dataset in DR Congo, 2009-2014	1,107 samples tested • 36% MPXV • 41% VZV • **12% coinfected** • 11% negative • No data on HIV status Median age: • 13 yrs all tested • 14 yrs MPXV alone • 13 yrs VZV alone • **11 yrs coinfection**	Not reported	Coinfection (MPXV+VZV) cases more likely to report fatigue, conjunctivitis, "bed-ridden" vs VZV alone, but less likely to report these symptoms vs MPXV alone
Mpox and VZV	Sayad et al, 2025	Systematic review of case reports and case series up to Mar 2025	• Global, all ages • 448 cases, 4 deaths • 12/18 studies from Africa • Some cases with HIV • Inconsistent data on HIV and VZV vaccination status • 1 case with prior mpox vaccination • 50-65% under 20 yrs	**Antivirals** • Topical/IV acyclovir • PO valacyclovir • PO tecovirimat • IV cidofovir • HIV ART **Antibiotics** • Topical mupirocin • IV clindamycin • PO amox-clavulanate • IV ceftriaxone **Supportive care** • Antihistamines • IV fluids • Antipyretics • Analgesics	• Sepsis and multiorgan dysfunction • Bacterial superinfection • Keloids • Ocular opacity

What do we know about mpox and viral coinfections in children?

	Notable publications	Data type	Geography and population	Management	Clinical Complications
Mpox and Measles	None	N/A	N/A	N/A	N/A
Mpox and Herpes Simplex Virus 1/2 Similarity of rash morphology with mpox can cause diagnostic issues	Case reports among sexually active adults	Case reports	Generally reported as severe genital and perianal rash/ulcers in adults; men who have sex with men >> heterosexual men and women Frequently reported in people with HIV	Acyclovir and tecovirimat plus supportive care	Proctitis (inflammation of the lining of the rectum); severe, necrotic, and coalescing skin lesions, delayed wound healing, severe secondary bacterial infections, and, in severe cases, multi-organ failure

Gaps and Limitations: Surveillance and Research

- The "whole-of-society" approach in pandemic preparedness is often lacking for children, even for a disease where they bear significant burden
- There is a significant lack of data to guide mpox preparedness for (African) children
  - We are repeating the same mistakes for COVID-19
  - Age-based data disaggregation for children should be of paramount importance
  - Not <18 y, not <20 y, not <30 y, but five-year age bands eg 0-4, 5-9, 10-14y, etc
  - Detailed, large-sample data on clinical presentation and outcomes
  - Detailed data on underlying comorbidities and co-infections with common childhood pathogens
  - Treatment options for children – inclusion in studies/trials post-tecovirimat; eg brincidofovir/cidofovir, direct-acting antivirals and antibody therapies

What we are doing about the gaps

VERDI consortium

- Pediatric mpox registry, 0-17 years
- 1,108 children with mpox from DRC, Ghana, Nigeria, Spain, Mexico, USA
- Detailed clinical data
- First analysis ongoing for publication
- Keep as an active open registry for future additions?

Africa-led Mpox Research Consortium (MpoxReC)

- MPOXGECIVO study (Mpox Genomics, Epidemiology, Clinical, Immunological and Virological Outcomes: A Multi-Country Cohort in Africa)
- DRC, Cameroon, Nigeria, all populations, adults, **children**, pregnant women, men who have sex with men, sex workers
- Three-year, mixed methods study
  - Aim 1: Mpox incidence and seroprevalence
  - Aim 2: Clinical, virological, immunological responses
  - Aim 3: Genome sequencing for viral evolution
  - Aim 4: Socio-behavioral studies

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For more information on this subject, please see the following publications/resources:

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