Mpox Collaborative Surveillance

EPI-WIN webinar

26 September 2024

Overview of global mpox surveillance and diagnostics

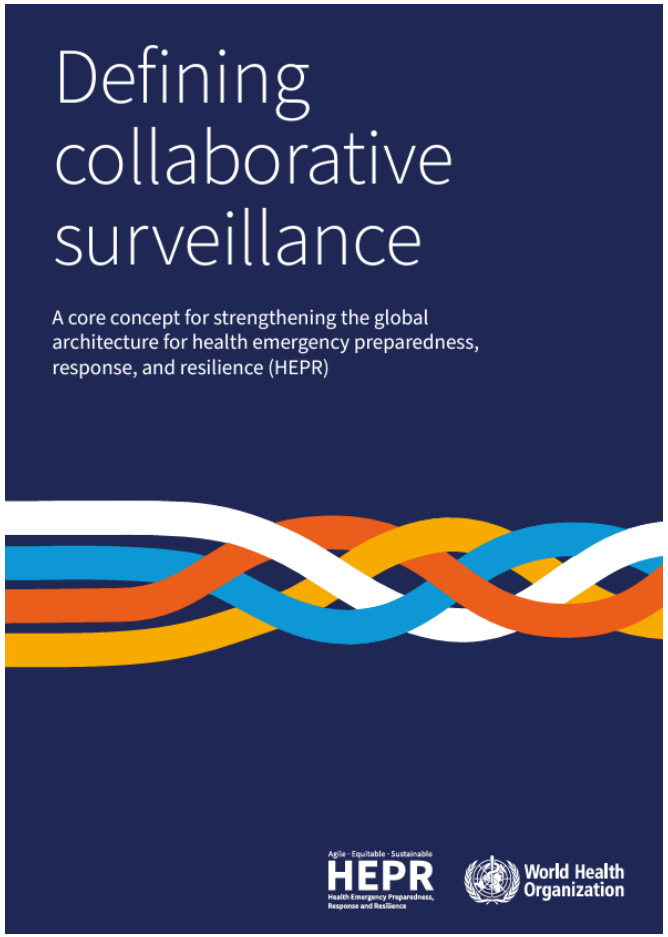
Ana Hoxha

Collaborative surveillance

- Collaborative surveillance is the **systematic strengthening of capacity and collaboration among diverse stakeholders**, both within and beyond the health sector, with the ultimate **goal of enhancing public health intelligence and improving evidence for decision-making**[1].

- Three critical objectives:
  - strong national **integrated** disease, threat, and vulnerability **surveillance**
  - **effective diagnostics and laboratory capacity** for pathogen and genomic surveillance
  - collaborative approaches for **event detection, risk assessment**, and **response monitoring**.

- Pillars for mpox: epidemiology and surveillance, laboratory and diagnostics, risk assessment and analytics



World Health Organization

[1] Defining collaborative surveillance: A core concept for strengthening the global architecture for health emergency preparedness, response, and resilience (HEPR) https://www.who.int/publications/i/item/9789240074064

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Mpox global indicator-based surveillance (IBS)

- Based on case definitions: suspected, probable and confirmed cases
- Two components
  - **I. Aggregated number of cases by week/month by country**
    - From IHR communication, official national data sources
    - Comprehensive
    - Timely
  - **II. Case-based data**
    - Minimum dataset of variables defined for WHO Case Reporting form (CRF), shared by Member States
    - Not comprehensive
    - Not timely

Surveillance, case investigation and contact tracing for mpox (monkeypox)

Interim guidance

20 March 2024

World Health Organization

Key points

- A multi-country outbreak of mpox (formerly monkeypox) has been ongoing since May 2022. The number of cases reported at the global level peaked in August 2022, followed by a steady decline until April 2023 and a smaller increase in cases from June-November 2023. The WHO regions with the most reported laboratory-confirmed cases are the Region of the Americas and the European Region, followed by the Western Pacific and African regions.
- The overall goal of continued mpox surveillance, case investigation and contact tracing is to detect new outbreaks and stop transmission in order to contain the global outbreak, protect people at risk in endemic and new settings, and make progress towards elimination of human-to-human transmission.
- The key objectives of surveillance and case investigation for mpox are to: rapidly identify cases and clusters in order to provide optimal clinical care; isolate cases to prevent further transmission; identify, manage, and follow up contacts to recognize early signs of infection; identify risk groups for infection and for severe disease; protect frontline health workers; and tailor effective control and prevention measures.
- Key actions of the response to the outbreak include informing those who may be most at risk for mpox with accurate information; offering pre- and post-exposure vaccination to individuals at risk; stopping further spread; and protecting vulnerable individuals and frontline workers.
- Clinicians should report suspected cases immediately to relevant public health authorities.
- Probable and confirmed cases of mpox should be reported to WHO through IHR national focal points (NFPs) as early as possible, at least once monthly, including a minimum dataset of epidemiologically relevant information, in line with Article 6 of the International Health Regulations (IHR 2005) and the mpox standing recommendations issued by the Director-General of WHO (August 2023). In areas where mpox is endemic, presumed or suspected cases that meet the national case definition (i.e., cases that are clinically compatible) should also be reported to WHO.
- If mpox is suspected, case investigation should consist of a clinical examination of the patient in a well-ventilated room while using appropriate personal protective equipment (PPE), questioning the patient about possible sources of exposure, and safe collection and dispatch of specimens for laboratory monkeypox virus (MPXV) examination.
- As soon as a suspected case is identified, contact identification and contact tracing should be initiated.
- Contacts of probable and confirmed cases should be monitored, or should self-monitor, daily for any sign or symptom for a period of 21 days from last contact with an infectious case or potentially contaminated materials.
- Quarantine or exclusion from work is not necessary during the contact monitoring period as long as no signs or symptoms develop. WHO encourages contacts to rigorously practice hand hygiene and respiratory etiquette, avoid contact with persons who are immunocompromised or pregnant, avoid or minimize contact with children, and avoid sexual contact with others throughout the 21-day monitoring period. Non-essential travel is discouraged during this period.

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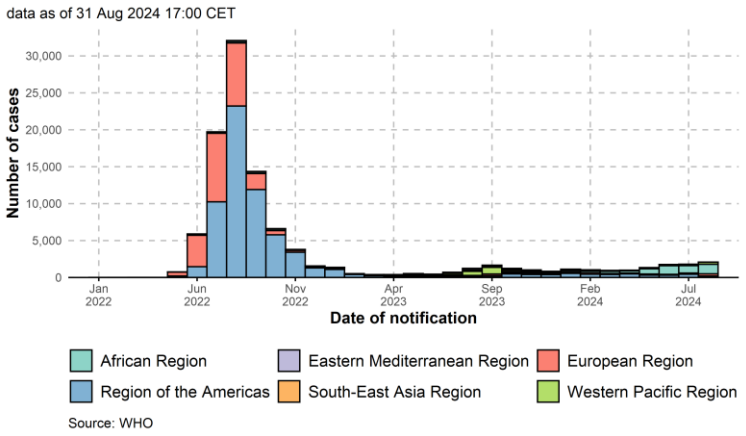

World Health Organization

Surveillance, case investigation and contact tracing for mpox (monkeypox): Interim guidance, 20 March 2024
https://www.who.int/publications/i/item/WHO-MPX-Surveillance-2024.1

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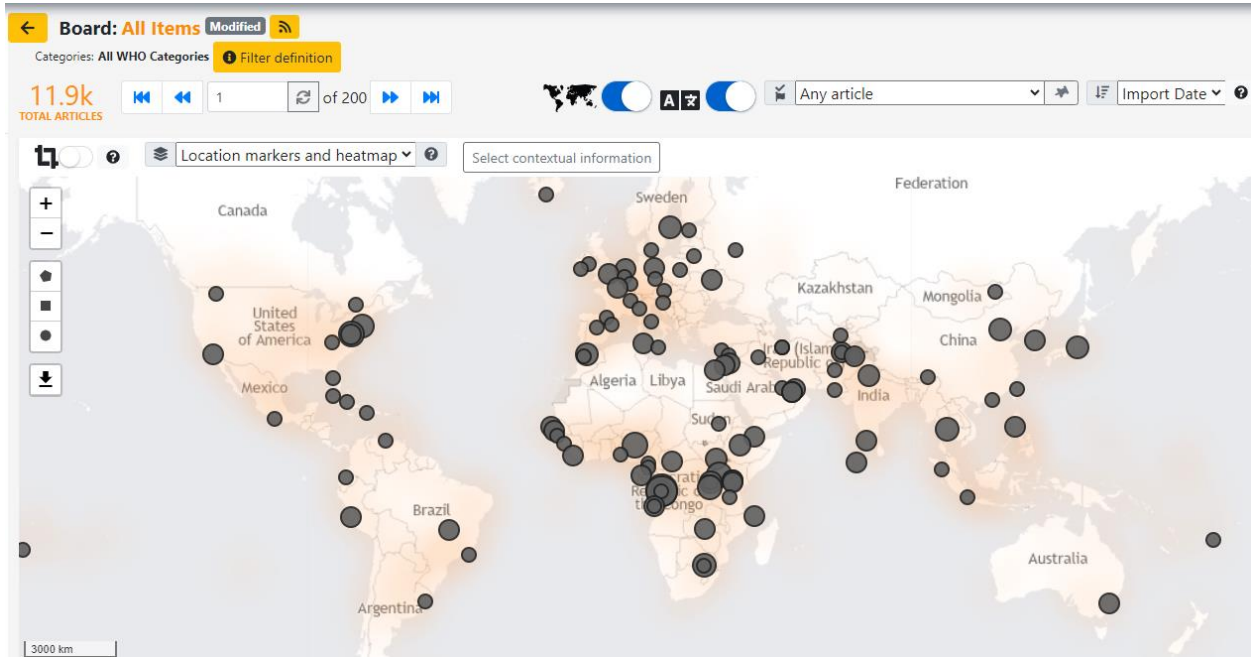
Mpox event-based surveillance (EBS)

- Systematic screening of **alerts from media** sources
- **Focus on clade I**, especially Ib
  - newly reported **cases and deaths**
  - changing mpox **epidemiological situation**
  - implemented **public health social measures**
  - new epidemiological and modelling **findings and publications**

EIOS EPIDEMIC INTELLIGENCE FROM OPEN SOURCES



Signals

Initial assessment classification

Alert	Signal for Immediate report to collaborative surveillance pillar
Monitor	Signal for EBS monitoring or follow up
Awareness	Signal for awareness

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Mpox community-based surveillance (CBS)

- Community-based surveillance (CBS) is the "**the systematic detection and reporting of events of public health significance within a community, by community members**"[1].
- Can allow early warning, case detection and control action.

Table 2: Community case definition

Any person with an unexplained, recently appearing skin rash or swollen lymph nodes. The skin rash can include single or multiple lesions in the genital region or elsewhere on the body including the mouth and eyes.

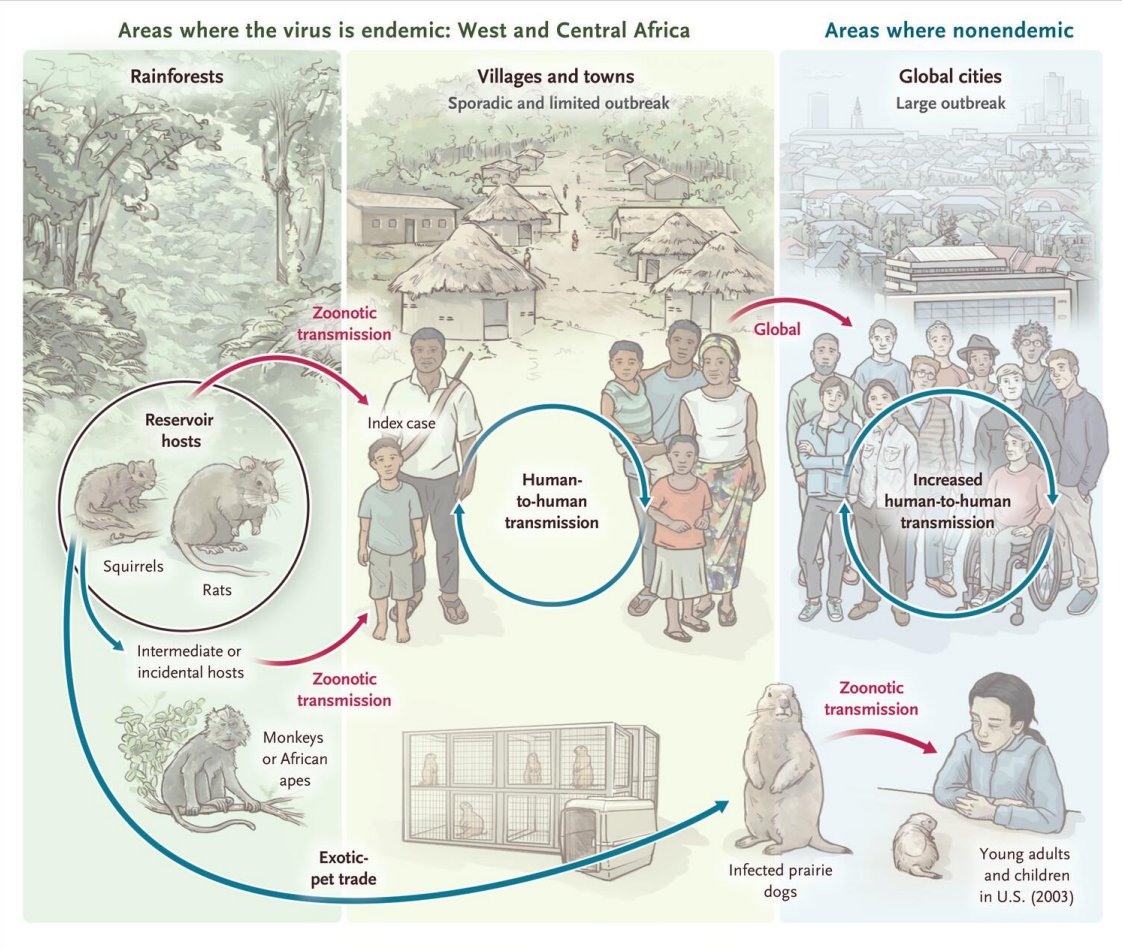
[1] Community-Based Surveillance: guiding principles https://www.ifrc.org/document/community-based-surveillance-guiding-principles

Mpox Surveillance Reporting Protocol for African Union Member States https://africacdc.org/download/mpox-surveillance-reporting-protocol-for-african-union-member-states

Mpox wastewater and environmental surveillance (WES)

- WES involves strategic sampling from sewage or human-impacted environmental waters to detect shedding of MPXV – **population based** by geography
- Part of **multimodal surveillance,** unlike case-based does not depend on symptoms or access to services
- Objectives: **early detection** of MPXV, identify **which clades** are circulating, and **inform** geographically targeted public health actions (e.g., public communication, testing)
- Applied research is required for expanded applications in unsewered settings with clade I in enzootic settings
- Uses similar analytic methods to clinical surveillance and may leverage aspects of existing WES (e.g. polio, SARS-CoV-2) for resource-efficiency

Monitoring animal infection



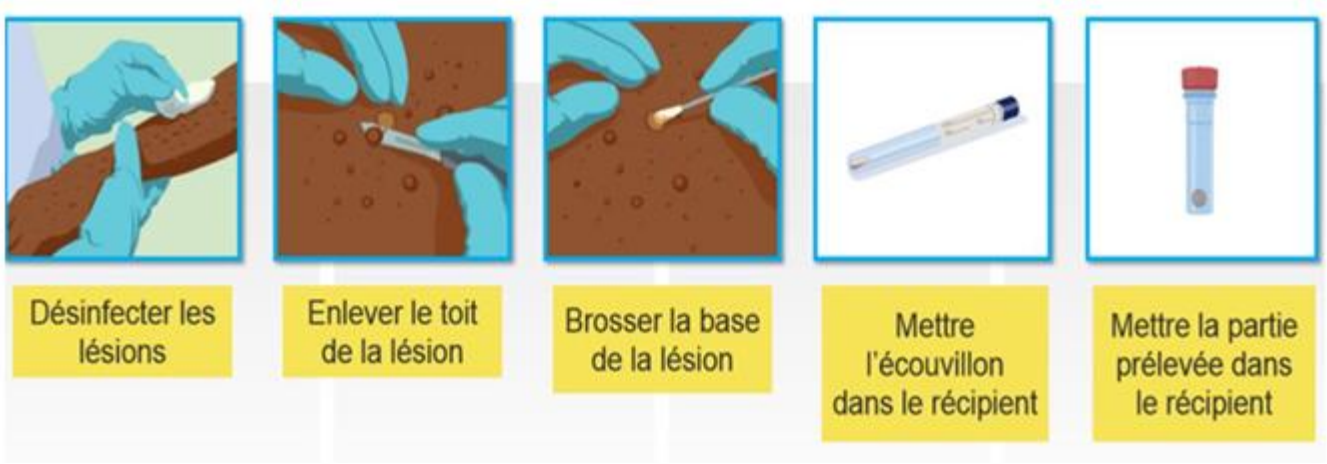
- WHO partners with the World Organisation for Animal Health (WOAH) for a coordinated response to mpox outbreaks in animal populations.
- **Objectives - Prevent transmission**:
  - From animals to humans (zoonotic transmission).
  - From humans to animals (reverse zoonosis).

Key Actions:

- Integrated surveillance of both animal and human populations.
- Risk assessment and management in affected regions.
- Guidelines for controlling the spread between species.

Mpox sampling

- **Testing**: **suspected** and **probable** mpox **cases**
- **Sample: lesion material** (swabs of surface and/or exudate, or crusts)
  - Oropharyngeal can be used for asymptomatic contacts, but if negative might need to be repeated
  - Blood is NOT recommended because viremia lasts short



Diagnostic testing for the monkeypox virus (MPXV)

Interim guidance

10 May 2024

World Health Organization

Key points

- Any individual meeting the case definitions for suspected or probable mpox should be offered testing.(1)
- Testing for the presence of MPXV should be performed in appropriately equipped laboratories by staff trained in relevant technical and safety procedures and conducted under relevant biosafety conditions based on a risk-based approach.
- The recommended specimen type for diagnostic confirmation of monkeypox virus (MPXV) infection in suspected cases is lesion material.
- Alternative specimen types, such as oropharyngeal swabs, can be collected from individuals who are contacts of suspected or confirmed mpox cases but have no visible skin or mucosal lesions. Note that these may lack sensitivity in pre-symptomatic cases, and testing should be repeated on lesion material if rash or mucosal disease develops.
- The presence of virus is confirmed by nucleic acid amplification testing (NAAT), such as real-time or conventional polymerase chain reaction (PCR). It is important for assays to target conserved orthopoxvirus (OPXV) or MPXV genes, to minimize the risk of assays being affected by sequence variants or gene dropouts.
- MPXV-clade specific NAAT and/or sequencing facilitates interpretation of mpox disease epidemiology. Scientists and public health professionals are strongly encouraged to share MPXV genetic sequence data in available and publicly accessible databases.
- WHO has released target product profiles for tests to be used for mpox diagnosis, highlighting key targets for test developers to pursue to optimize public health benefit and impact.(2)
- This document provides interim guidance for clinicians, laboratories, health workers, public health officials and other stakeholders involved in the diagnosis and care of patients with suspected, probable or confirmed mpox.
- This version of the interim guidance has been updated to reflect developments in mpox epidemiology and viral evolution with respect to the emergence of strains of Clade I MPXV with mutations that may evade diagnostic confirmation depending on the protocol targets.
- This is an updated version of the interim guidance on *Diagnostic testing for the monkeypox virus (MPXV)* and supersedes the guidance published on 9 November 2023.

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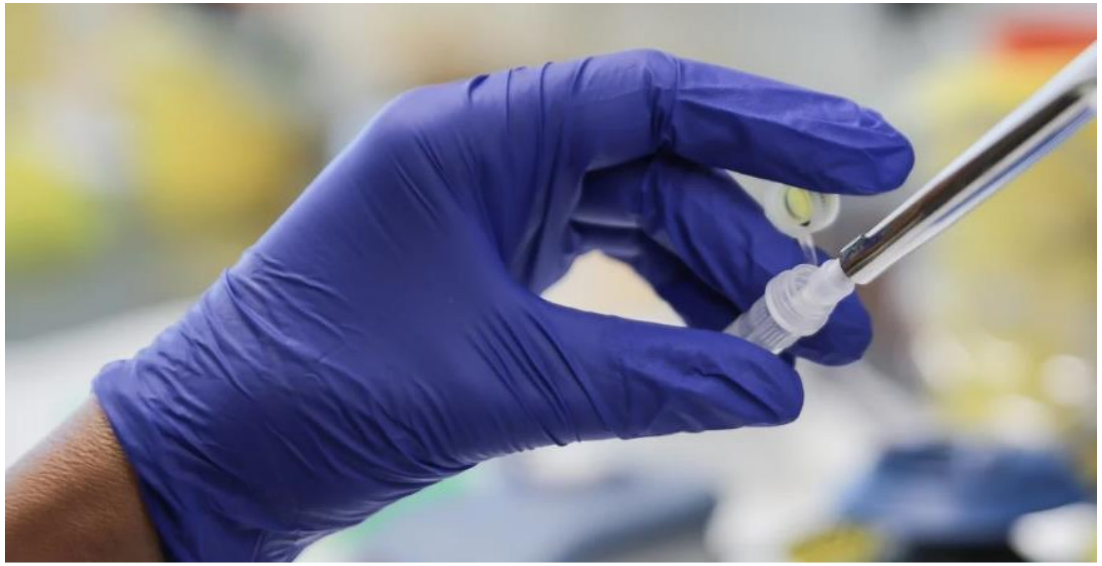
Mpox testing

- **Confirmation**: real-time or conventional **PCR**
  - Monkeypox virus (MPXV)
  - Orthopoxvirus (OPXV) in a MPXV outbreak
- **Point of care (POC) testing**
  - GeneXpert machines (Cepheid) detect OPXV and MPXV clade II, but not clade I
- **Antigen RDTs:** available on the market but showed insufficient accuracy in test evaluations (very specific but poorly sensitive)
- **Serology** is **hard to set up** at reference laboratories, so antibody RDTs claiming to be able to distinguish monkeypox virus specific antibodies are likely to be **unreliable**

Test evaluation and procurement

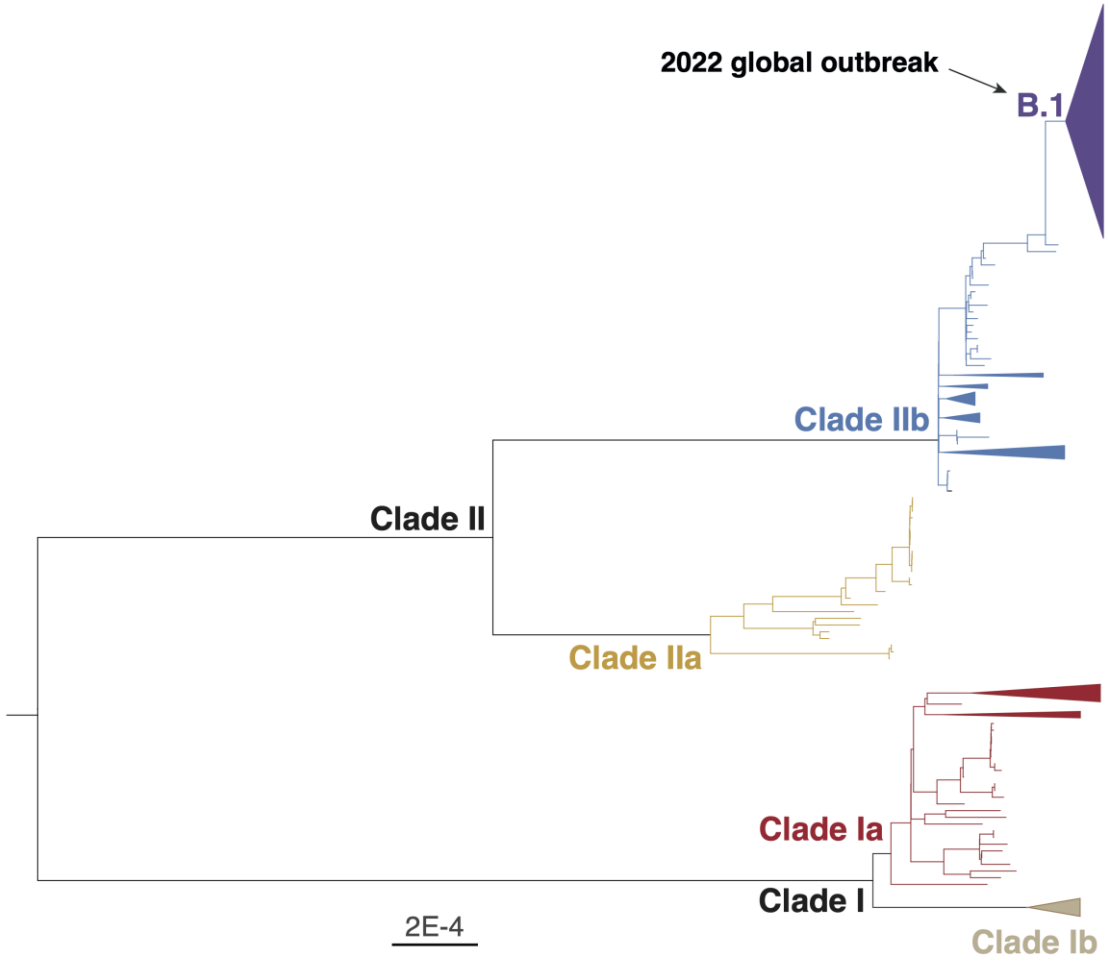
- Submissions for **Emergency Use Listing** (EUL) for mpox in vitro diagnostics are open
- Ongoing **evaluations of POC tests and AgRDTs** with various stakeholders (e.g. FIND)
- **WHO Global External Quality Assessment**: starts shipping panels October 2024 to 136 countries and territories (largest EQA ever in terms of number of countries)
- **Access and Allocation Mechanism** (AAM) established with partners includes diagnostic tests



WHO urges rapid access to mpox diagnostic tests, invites manufacturers to emergency review

29 August 2024 | News release |Reading time: 2 min (581 words)

Genomic sequencing



- **WHO monitors the spread of MPXV strains**
- **Clade Ia and Ib isolates are available in the WHO Biohub** (live viruses or PCR control material) for all countries (**non-commercial purpose**) who wish to access such material
- Coordinated **functional characterization of clade Ib** (compared to clade Ia) ongoing

Mpox surveillance and country support in Africa

Kyeng Mercy

Main surveillance activities for countries

- Designate/maintain mpox as a **notifiable disease**
- Leverage **multiple surveillance approaches** (event-based, community-based, and indicator-based)
- Ensure **regular and timely reporting** and **communication through IHR notification** for **mpox cases with travel history**
- **Build capacity for accurate and timely diagnosis at all healthcare levels**
- Ensure that **testing algorithms can detect all viral clades and subclades**
- **Carry out genetic characterization and data sharing** to track the spread of different clades
- **Monitor MPXV infection in animals in countries with human cases linked to animal exposure**
- **Take key actions to break transmission chains**, such as early case detection, isolation, contact tracing and monitoring, and IPC measures.

Epidemiological update

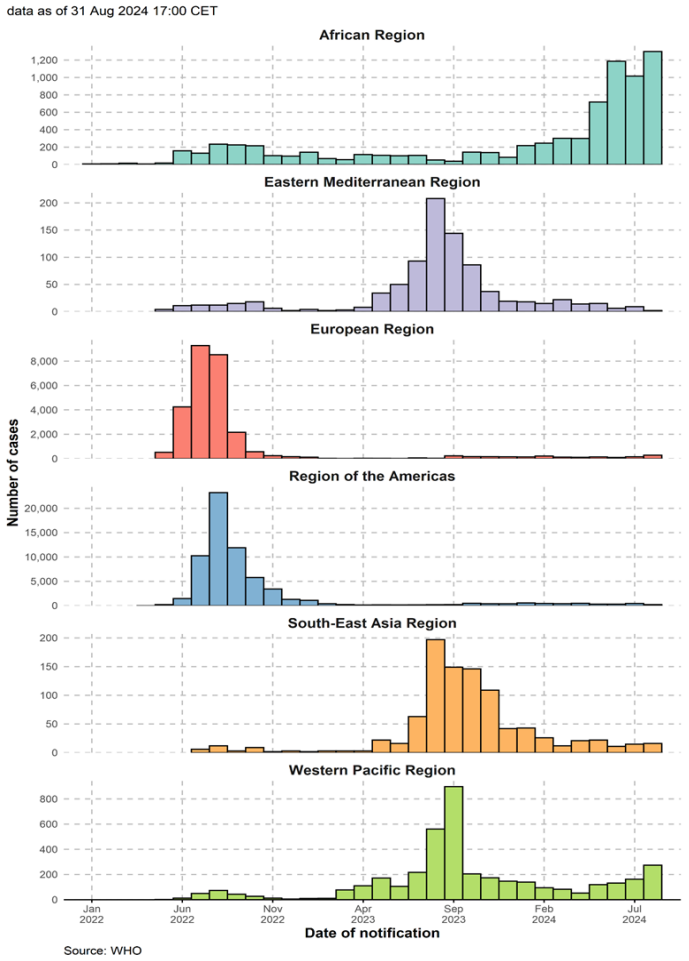
Michel Muteba

Global mpox situation 2022-2024

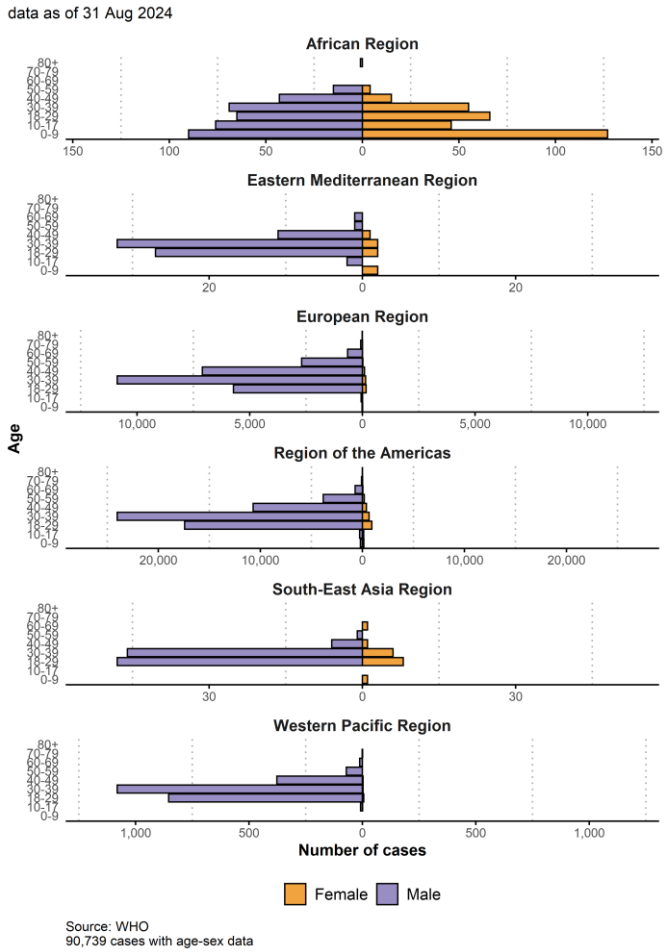
Data as updated monthly; from 01 January 2022 to 31 August 2024

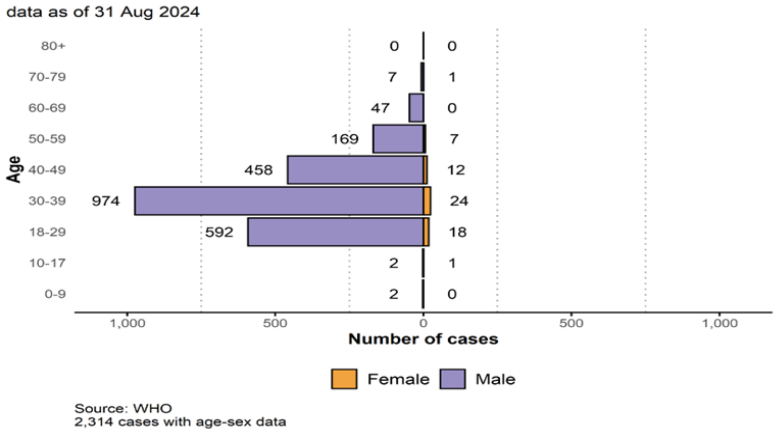
Total lab confirmed cases in August 2024 2 082	Total lab confirmed deaths in August 2024 1	Countries reporting cases in August 2024 48
Total lab confirmed cases in 2024 11 095	Total lab confirmed deaths in 2024 50	Countries reporting cases in 2024 70
Total lab confirmed cases 106 310	Total lab confirmed deaths 234	Countries reporting cases 123

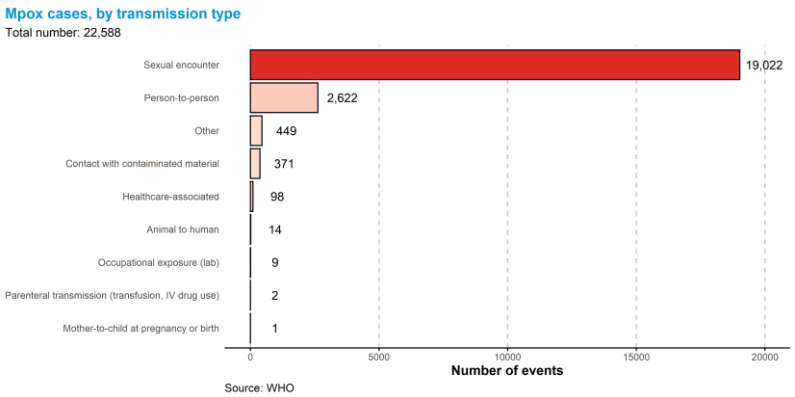
Long tail of 2022-24 outbreak in most regions, with rapidly increasing cases in the African Region



Main characteristics of confirmed mpox cases*, last 6 months







Case profiles

From 01 Mar to 17 Sep 2024

	Reported values		Unknown or Missing Value
	Yes	No	
Men who have sex with men	251 (86.6%)	39 (13.4%)	2,212
Persons living with HIV	244 (46.3%)	283 (53.7%)	1,975
Health worker	21 (2.5%)	831 (97.5%)	1,650
Travel History	104 (17.3%)	497 (82.7%)	1,901
Sexual Transmission	385 (93.7%)	26 (6.3%)	2,091
Hospitalized[†]	167 (10.3%)	1,449 (89.7%)	886
ICU	0	288 (100.0%)	2,214
Died	1 (0.1%)	1,323 (99.9%)	1,178

[†] May be hospitalized for isolation or medical treatment

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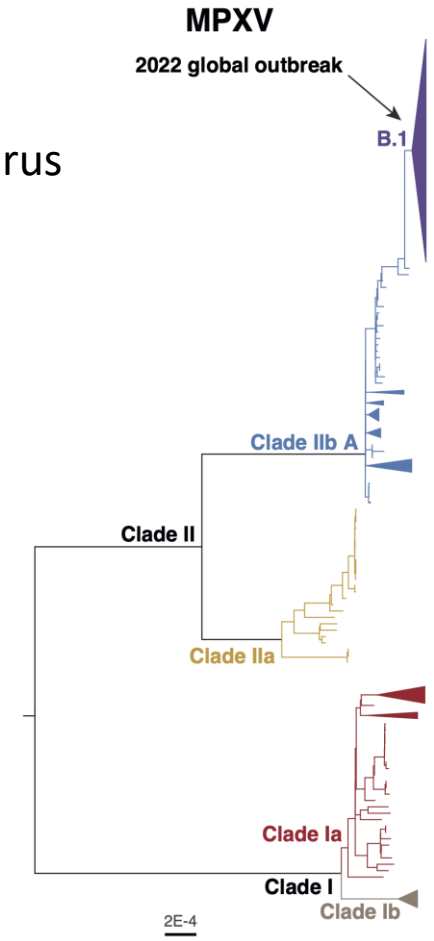
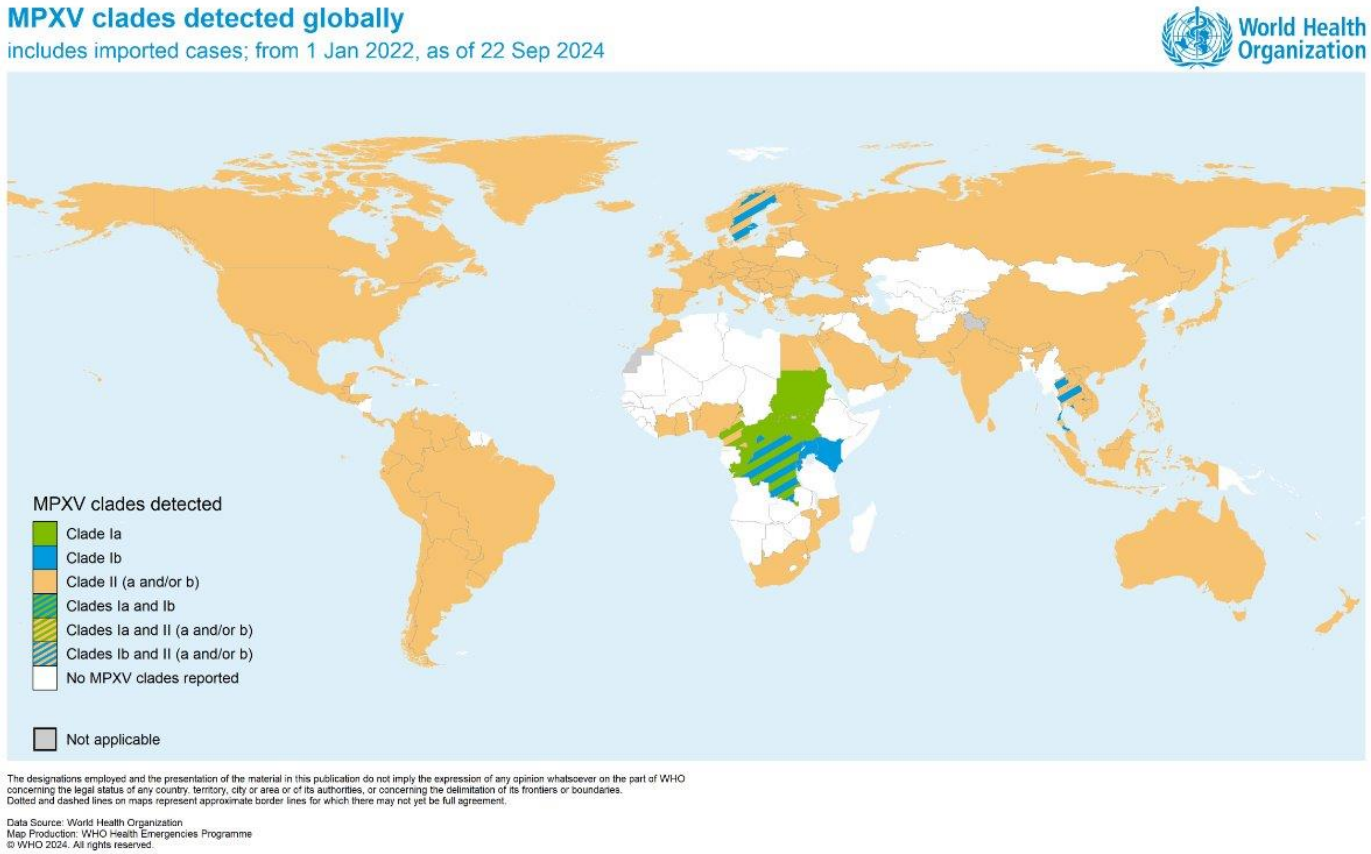
MPXV clade distribution

There are two monkeypox virus (MPXV) clades:

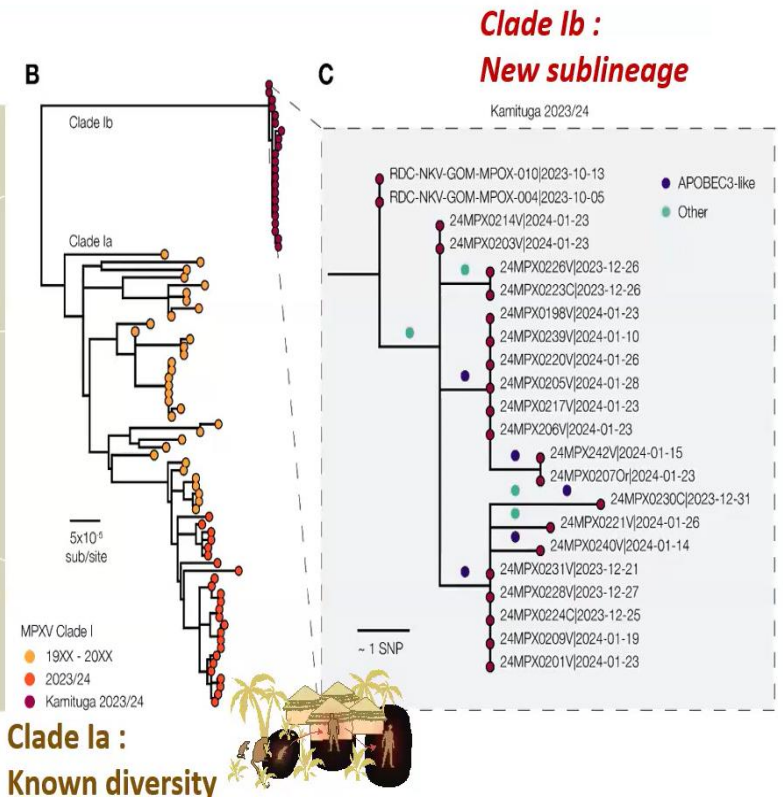
- Clade I (Central Africa): subclades Ia and Ib
- Clade II (West Africa): subclades IIa and IIb

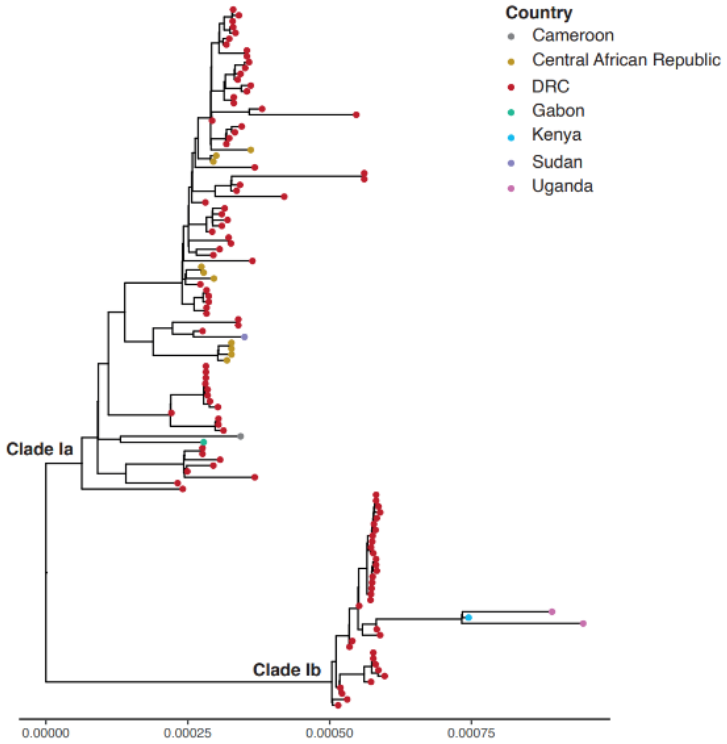




The proportion of samples sequenced is very low and the information available might not be fully representative of the clade distribution

MPXV Clade Ib in the Democratic Republic of the Congo





- New Clade I strain* first detected in the **eastern part of DRC** (South Kivu)
- Presents APOBEC3-type mutations indicating **sustained human-to-human transmission**
- Sustained community spread is ongoing for **over 12 months in absence of zoonotic exposure.**
- Proposed name for this strain: Clade Ib, given **similar** human-to-human transmission **as clade IIb which emerged in Nigeria in 2017**

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**Information from published article: Sustained Human Outbreak of a New MPXV Clade I strain in the East Democratic Republic of the Congo https://www.nature.com/articles/s41591-024-03130-3*

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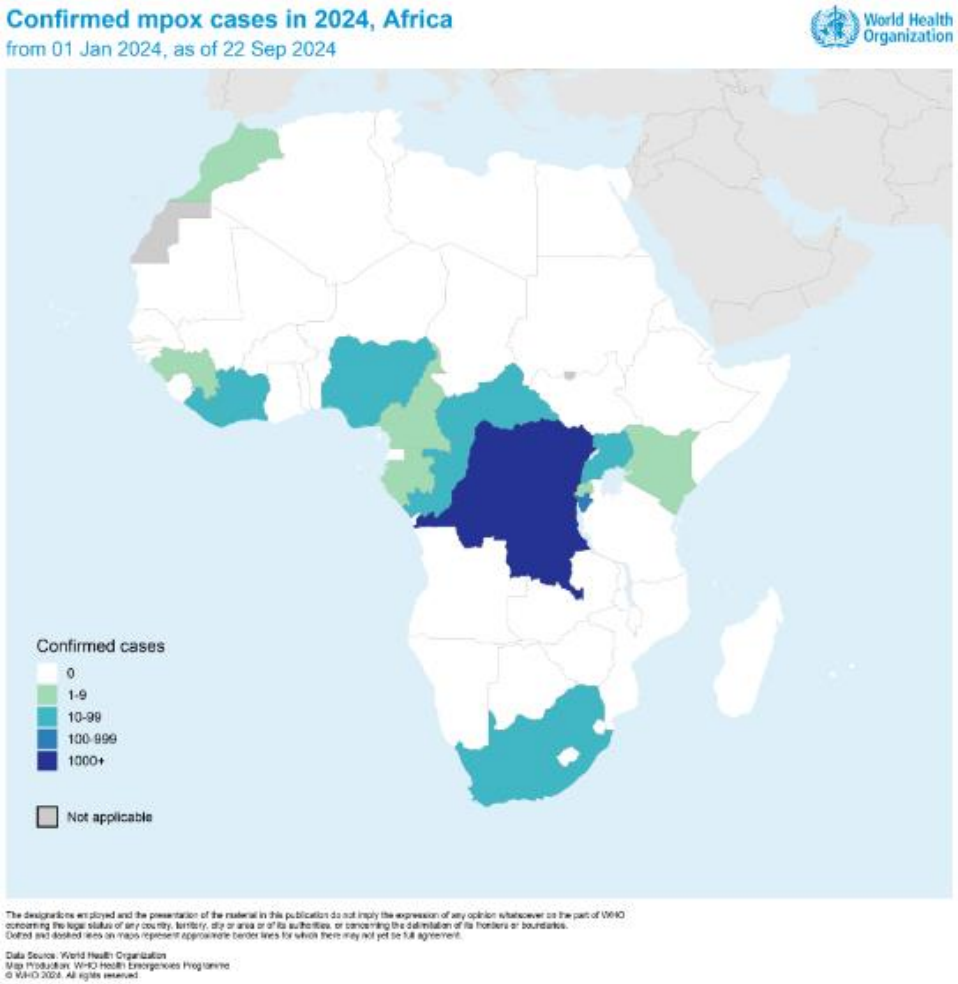
Focus on Africa (Confirmed cases) - 2024

1 January - 22 September 2024

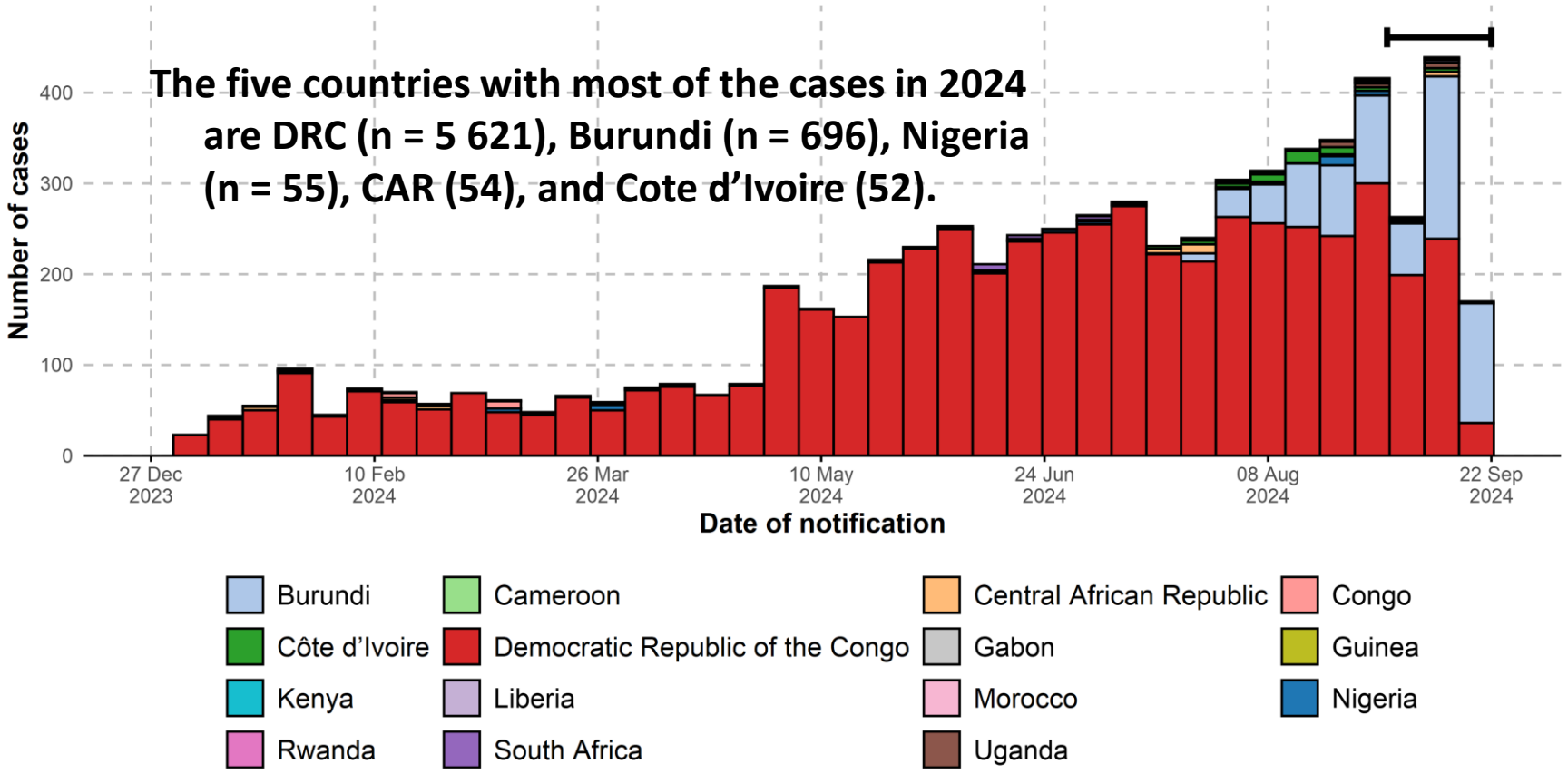


- Mpox **cases continue to increase** in the WHO AFRO
- **17 countries** in WHO AFRO affected from **2022-2024**
- **14 countries** affected in **2024**, and are active (reporting cases in the last 90 days)
- 9 countries reported new cases in the past two weeks (Burundi, DRC, Liberia, CAR, Cote' d'Ivoire, Kenya, Morocco, Rwanda, and Uganda)
- **Week 38** data (ending 22 Sep): **172 confirmed cases** (incomplete)
- Confirmed cases increased by 67% between weeks 36 (263 cases) and 37 (438 cases).
- **DRC and Burundi** reported 418 (**95%**) of all **confirmed cases** (438) in week 37

Epidemic curve of confirmed mpox cases in Africa

Total confirmed cases, 01 January – 22 September 2024

Bracket at end of curve indicates potential reporting delays in recent weeks of data.
Data as of 22 Sep 2024



Source: WHO

Total lab confirmed cases in 2024

6 580

Total lab confirmed deaths in 2024

32

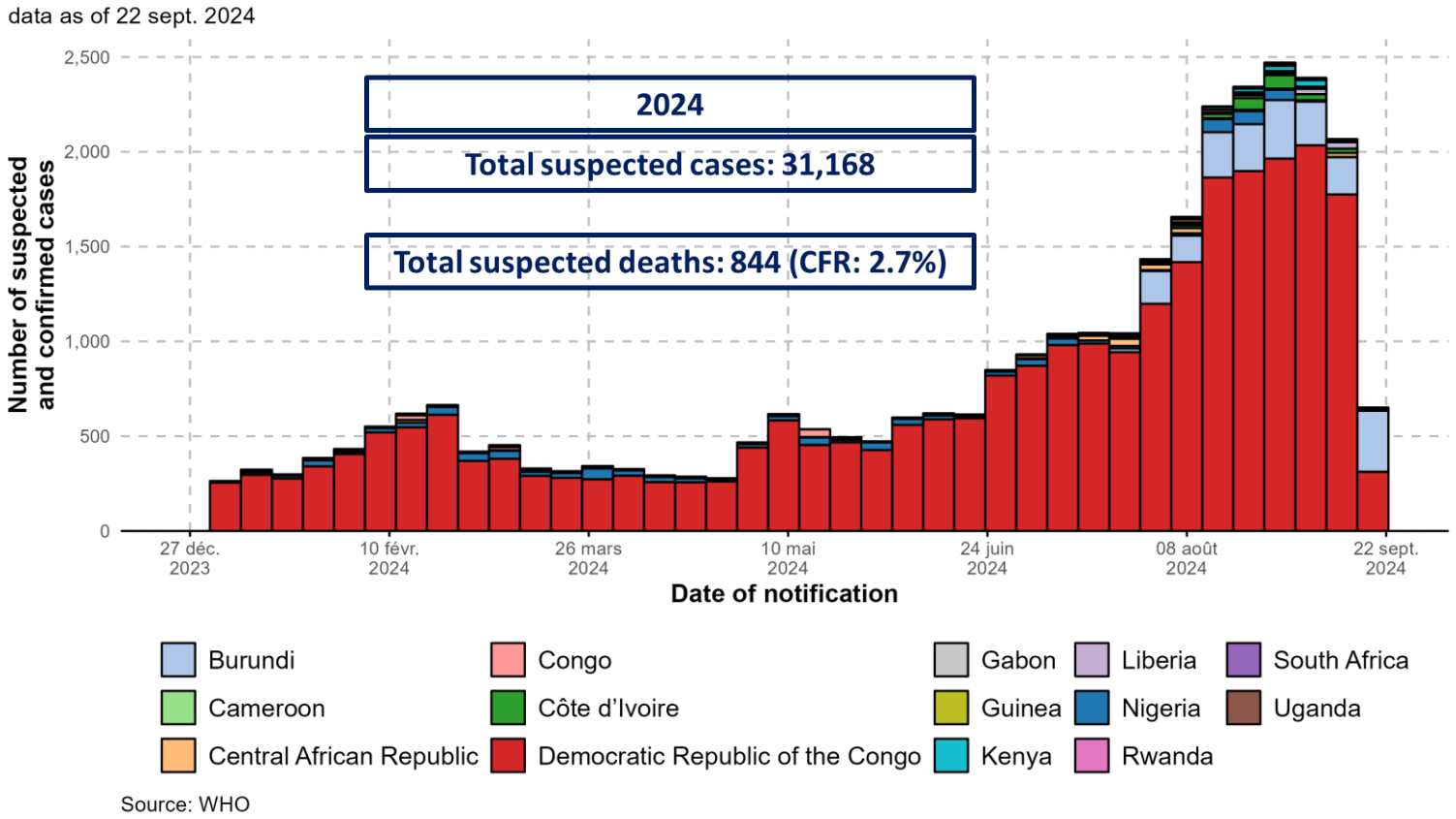
Countries reporting cases in 2024

15

Confirmed cases

- **2022: 1,232**
- **2023: 1,145**
- **2024: 6 times more cases than in 2023**

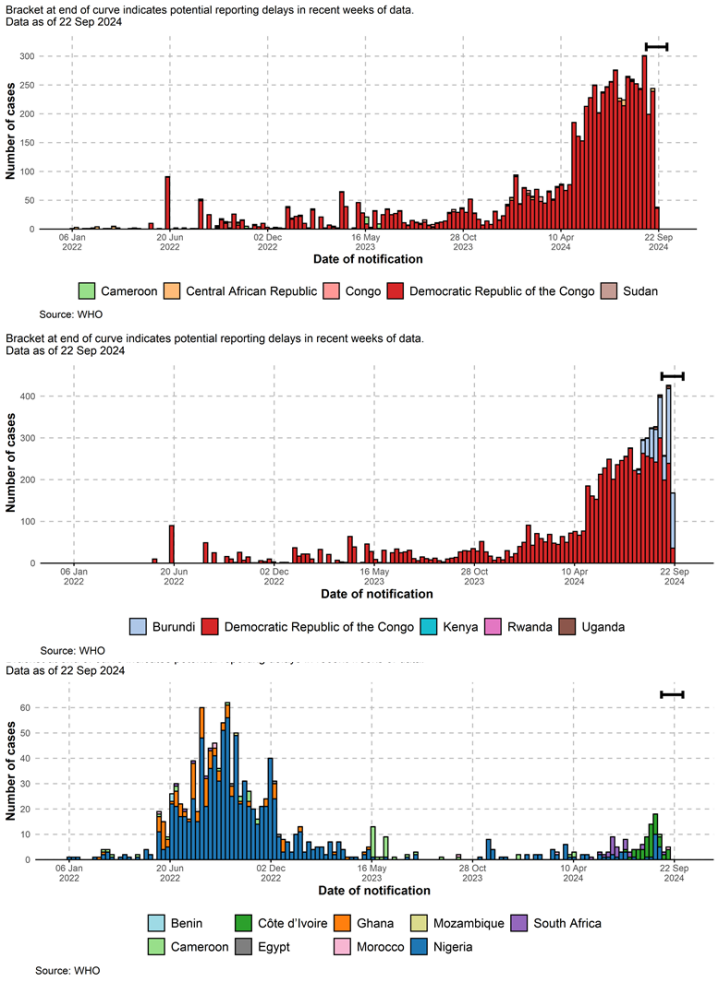
Epidemic curve of all mpox cases (suspected + tested) in Africa

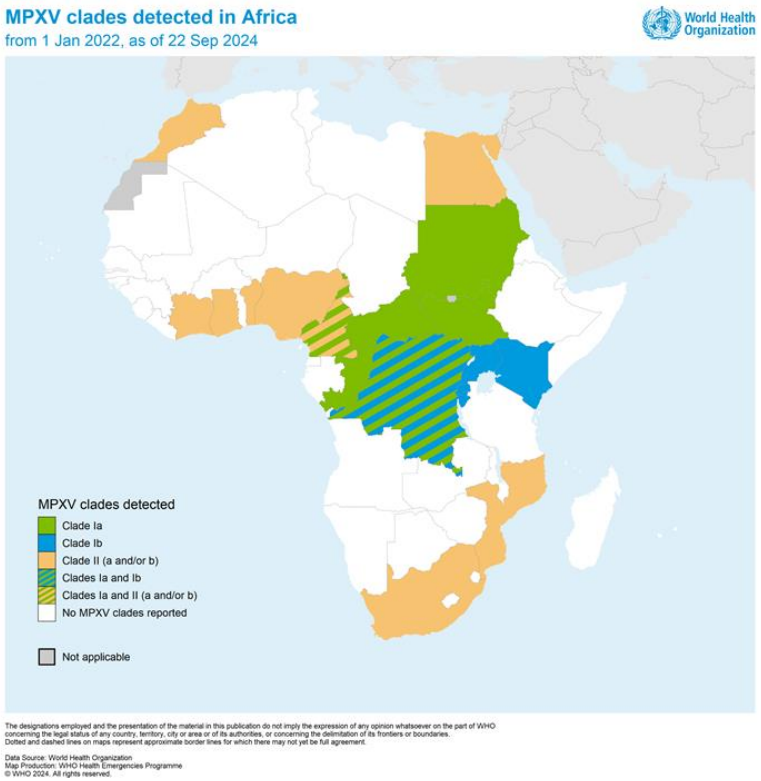


- In response to efforts to improve diagnostic capacity, **in 2024 45% of suspected mpox cases in DRC have been tested.** Test **positivity rate** at national level is around **55%**, varying between provinces and affected population.
- WHO also presents suspected mpox cases for better understanding of the epidemiological situation on the continent.

Mpox Clade Distribution and Countries reporting Clade Ib

July – September 2024



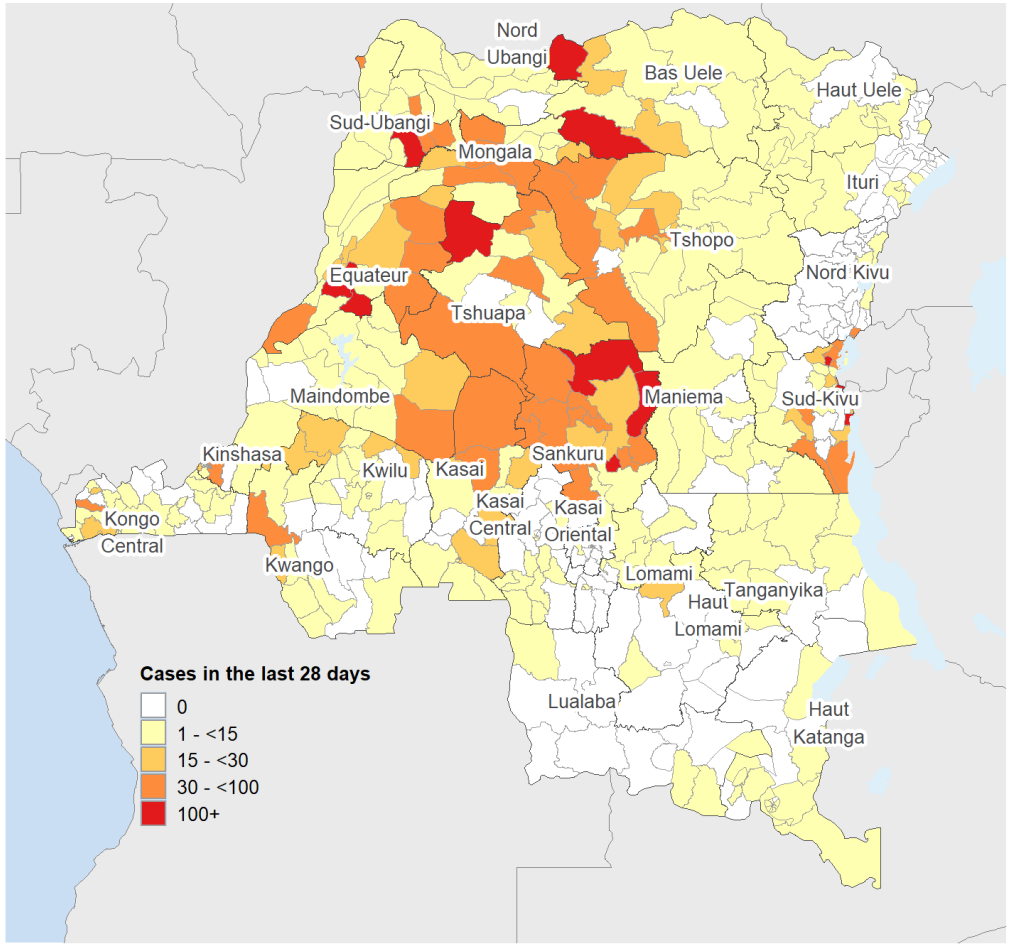


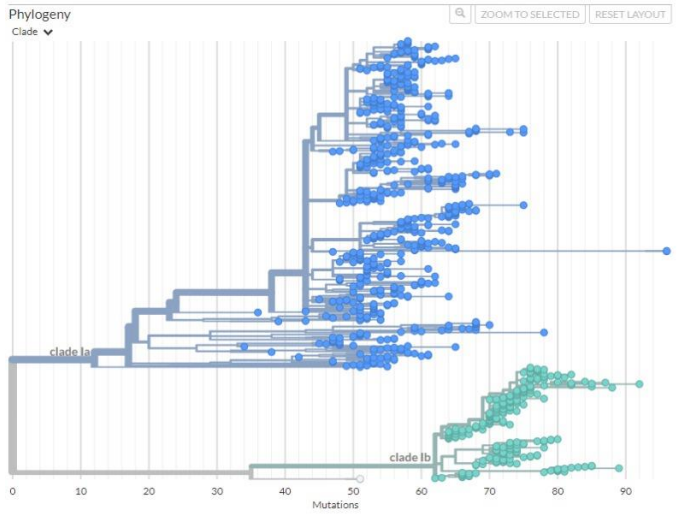
Country	# confirmed cases	# confirmed deaths	Distribution
DRC	Around 3500	22	Mainly South and North Kivu and few cases in Kinshasa
Burundi	707	0	Dispersed in the country
Uganda	22	0	Multiple districts, including capital
Kenya	7	0	Multiple counties, including capital, PoE with Tanzania & PoE with Uganda
Rwanda	6	0	3 in capital; 3 in border district
Sweden	1	0	Travel history to Africa
Thailand	1	0	Travel history to Africa

DRC: Two ongoing outbreaks in 2024

DRC: Suspected and confirmed cases (last 4 weeks)

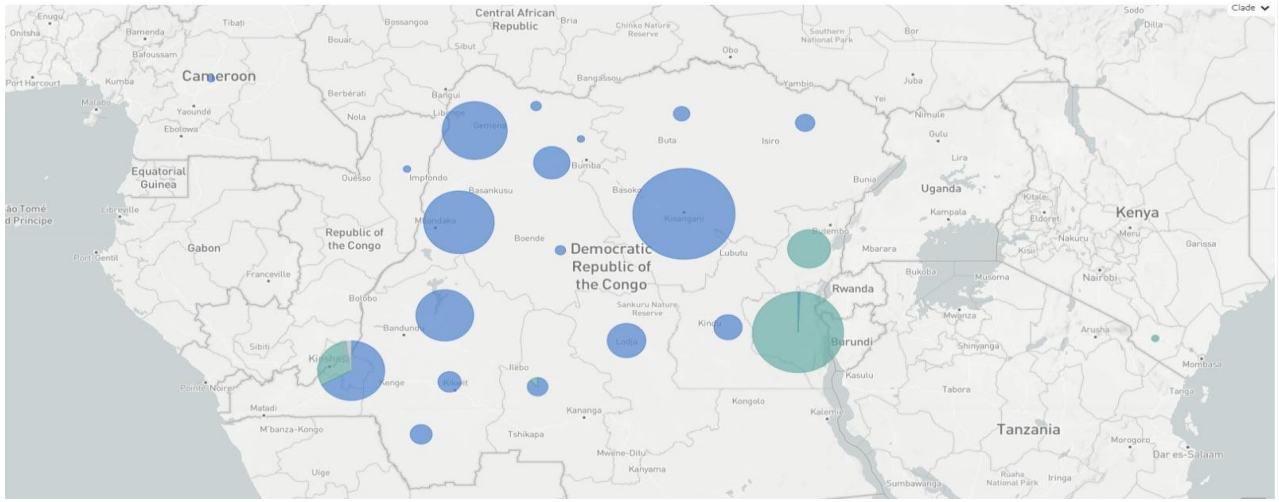
From 12 August to 15 September 2024





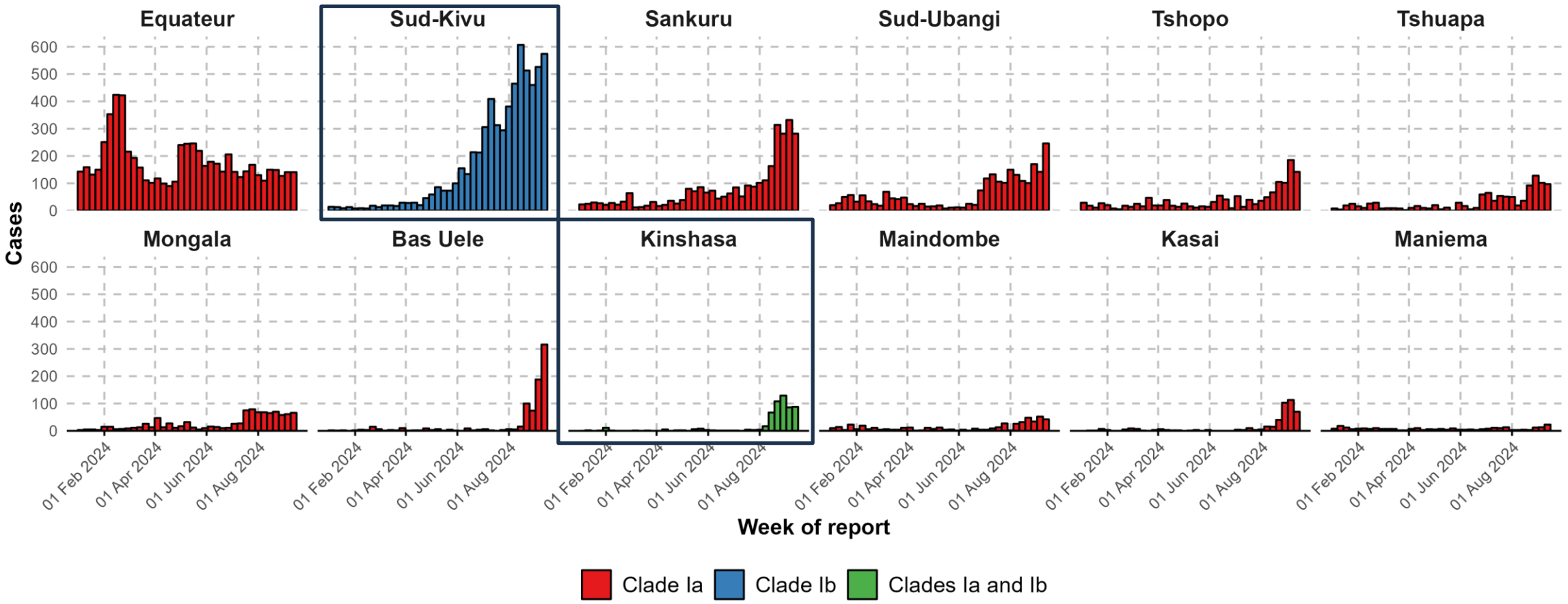
Clade Ia

Clade Ib



The number of MPXV samples sequenced in some regions is low; clade distribution might not be fully representative of ongoing MPXV circulation

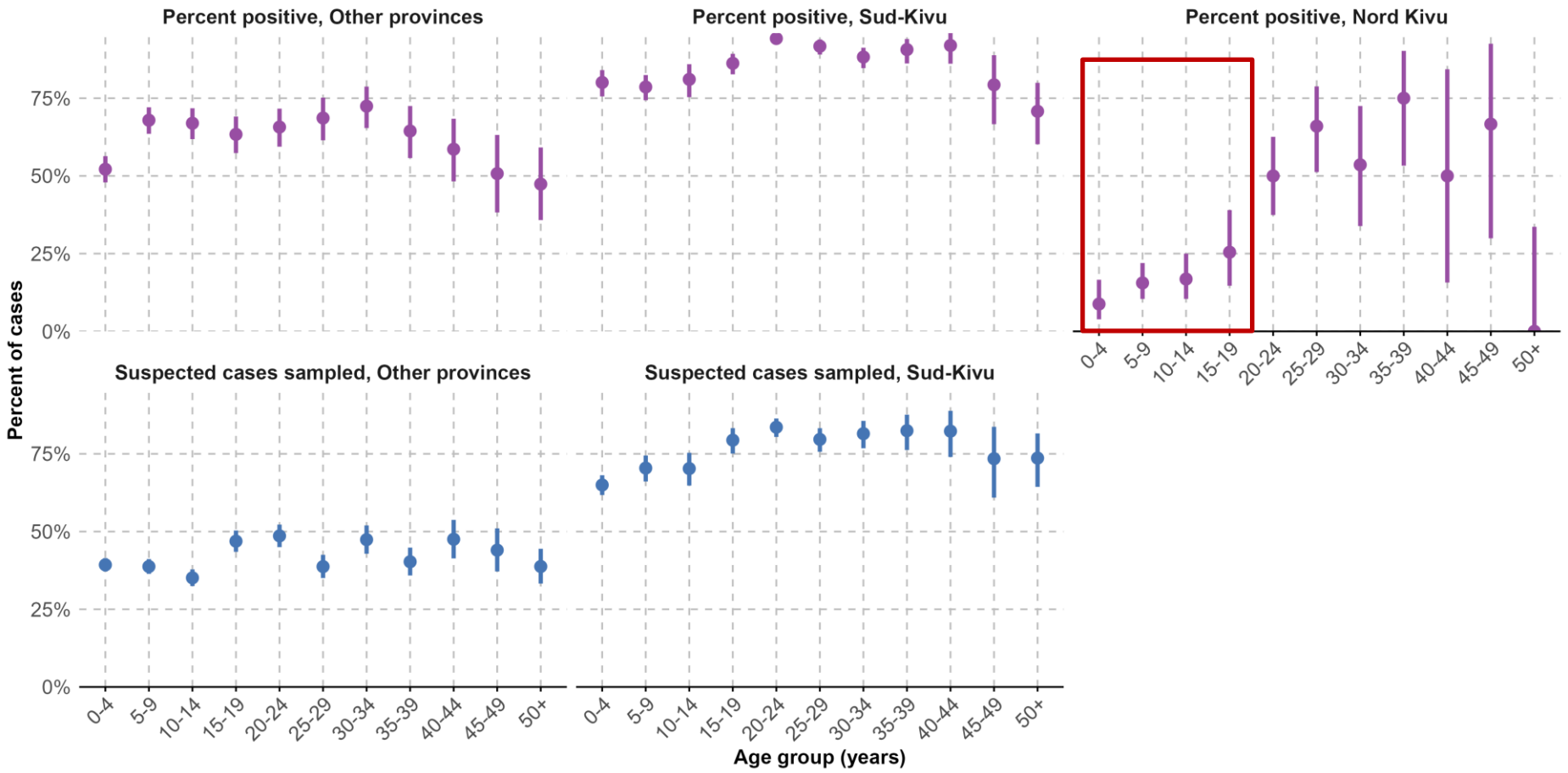
DRC: recent trends by province



Data source: Ministère de la Santé Publique

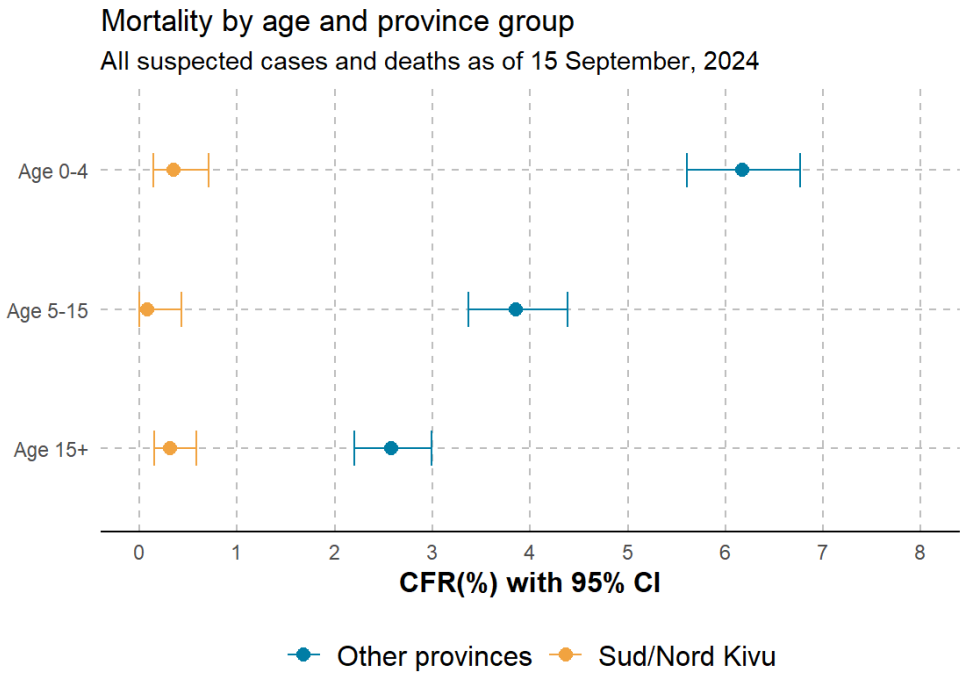
Testing and positivity rate in DRC, 2024

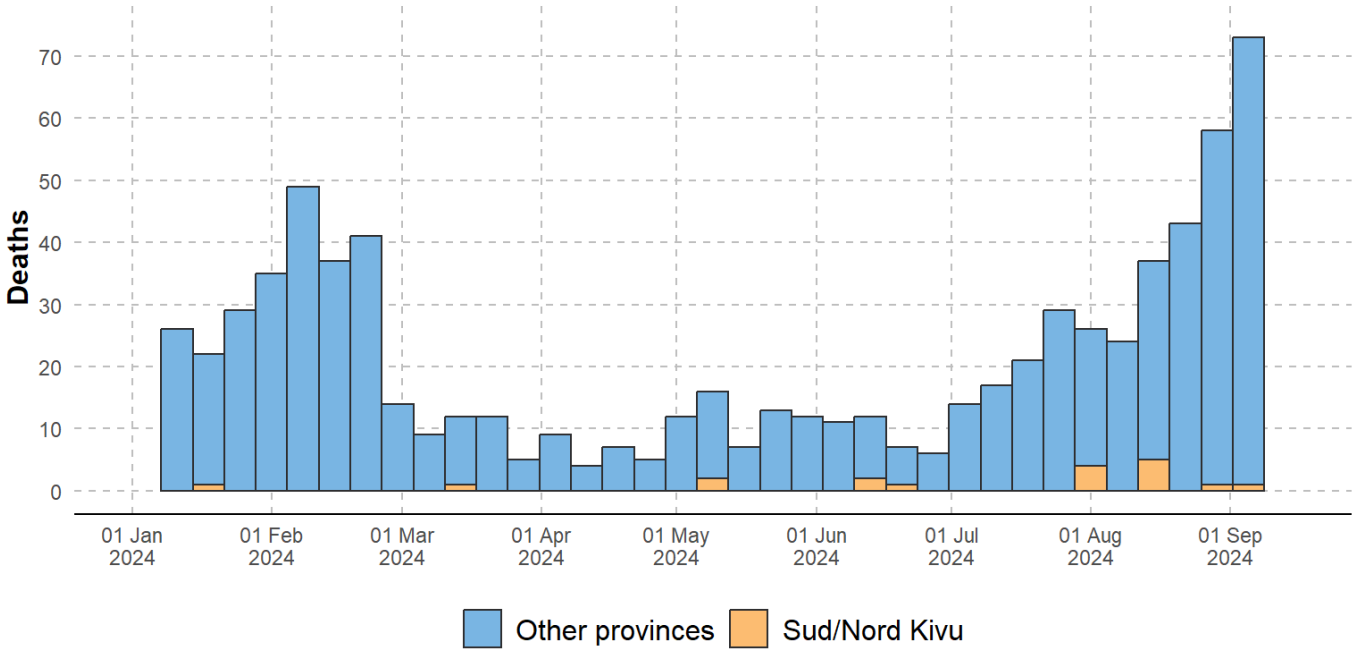
In North Kivu, children are significantly less likely to test positive than adults



Mortality of mpox in DRC (2024)

Case fatality ratio is significantly higher among suspected cases in endemic regions than in South and North Kivu





Source: IDSR data since Jan 2024

Based on 6482 cases and 18 deaths in Sud/Nord Kivu;

18976 cases and 806 deaths in other provinces.

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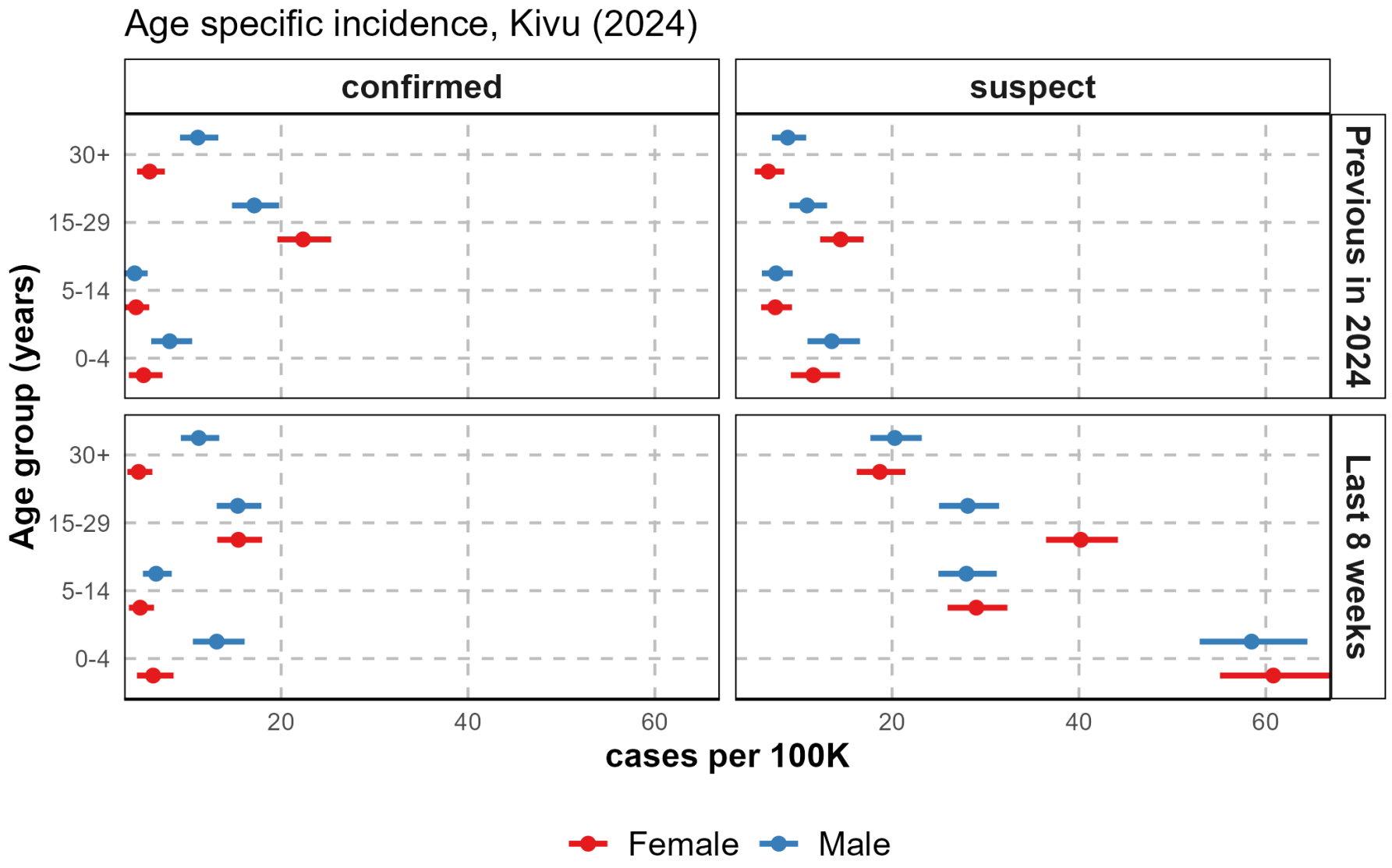
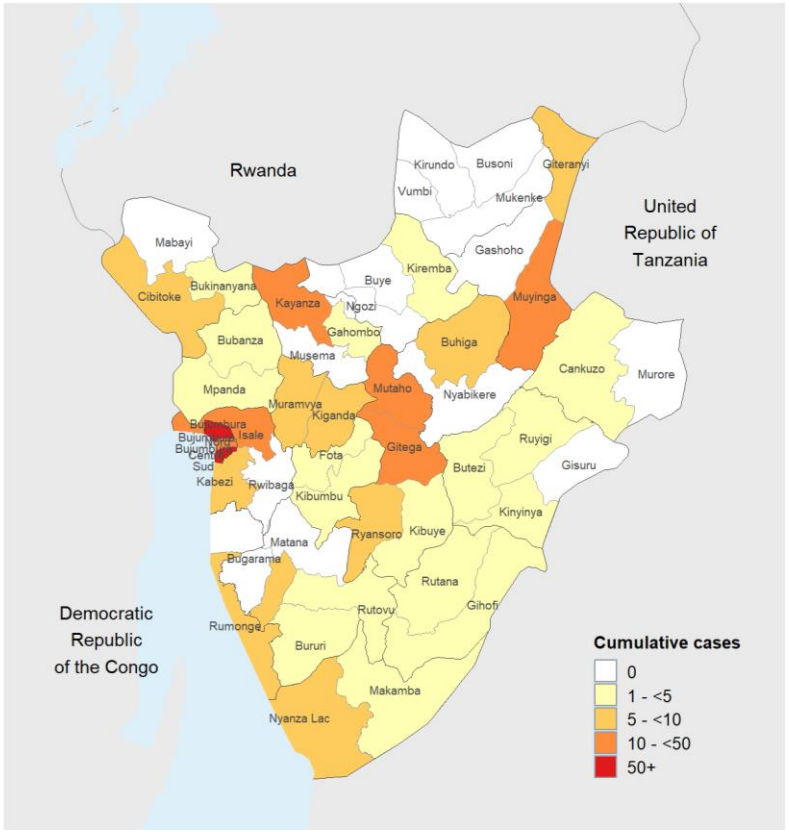
Age-specific incidence rates, Kivu

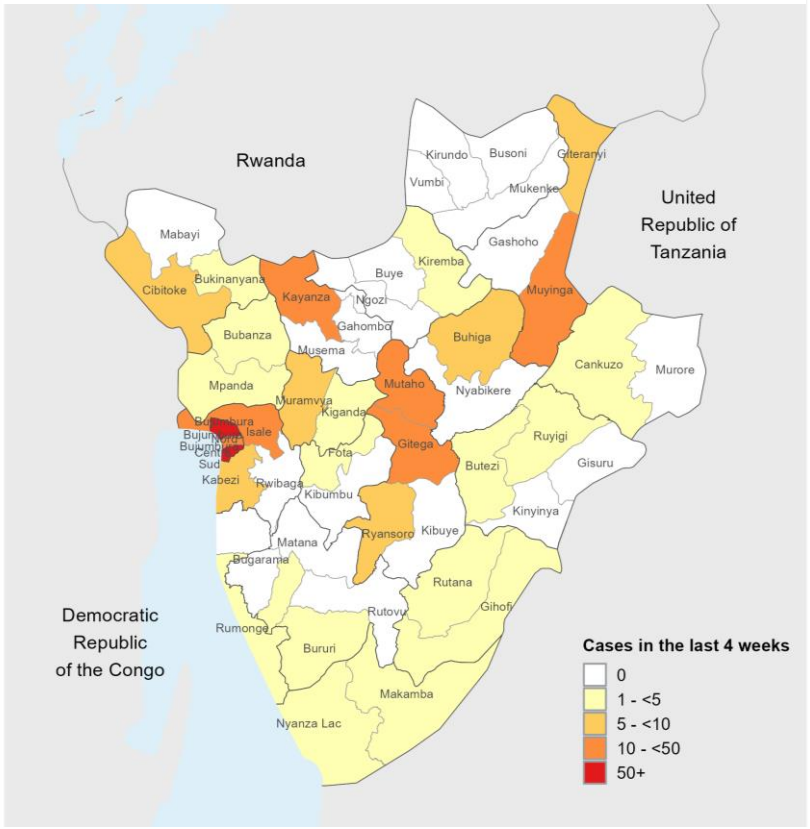


Burundi

2024, as of 15 September



Last 4 weeks, 19 August – 15 September 2024



- Mpox **outbreak** in Burundi was **declared on 25 July 2024**, driven by **clade Ib** of the virus.
- As of 24 September, **707 confirmed cases** with **no deaths** have been reported in **29 out of 49 districts**.
- 465 cases reported in the last 4 weeks, including 179 in the last week.
- **Northern Bujumbura** accounts for **44% of cases**, with a high **positivity rate of 38%,** indicating significant **community transmission**.
- **295 active hospitalized cases** are putting pressure on the healthcare system, despite 48% of cases having recovered.