



## Perspective

# High prevalence and non-suppression of HIV/AIDS in the East and Central African region heightens risk of severe outcomes for Clade I monkeypox virus infection, and may be a driver for subsequent adaptation

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## ABSTRACT

In September 2023, a re-emergence of mpox was noted in the province of South Kivu, in DR Congo. So far, active transmission has been reported in 23 of the 26 provinces. Despite localisation within DRC, there are emerging concerns about possibility of cross-border transmission. In this perspective, we highlight the threat posed to HIV positive patients, particularly those with unsuppressed viral loads. We make several prepositions as part of the preparedness and response plans in the countries in the East and Central Africa region. The six prepositions include: 1) operationalize the Joint Africa Task Force for mpox consistent with Kinshasa declaration on mpox, 2) increased surveillance, 3) deployment of point of care diagnostics, 4) targeted reactive vaccination and enhanced antiretroviral therapy of HIV positive patients in areas of active transmission, 5) community engagement, 6) foster capacity building of national rapid response teams in East and Central Africa in mpox care and management through collaboration with DRC counterparts.

## Background

As the COVID-19 pandemic transitioned into its 3rd year, in May 2022 the world witnessed an outbreak of a disease that previously had no history of sustained transmission beyond the endemic areas in central and west Africa [8]. The disease caused by the monkeypox virus (MPXV) is endemic in central and west Africa, infecting wild animals

and causing occasional zoonotic outbreaks. The disease was initially known as monkeypox, and later renamed mpox by the World Health Organisation (WHO). The disease rapidly spread to 110 countries by the end of 2022, with this outbreak driven by Clade IIB MPXV. From 2023, the number of cases in Central Africa has progressively increased, with the rise mainly driven by Clade I MPXV. In the Democratic Republic of Congo (DRC) where the largest number of cases has been reported,

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**Table 1**  
Number of HIV infected adults, and proportion with viral suppression for DRC and countries neighboring countries.

Indicator	Uganda	Tanzania	DRC	Zambia	Rwanda	Central Africa Republic	Rep of Congo	Burundi	Angola	South Sudan
No of adults with HIV ('000)	1360	1670	430	1340	224	113	133	73	283	143
HIV Prevalence rate (%)	5.1	4.3	0.6	10.8	2.3	3.4	4.1	0.9	1.5	1.58
Proportion of PLHIV suppressed (%)	79	92	87.4	86	90	-	-	79	-	86

active transmission has been reported in 23 of the 26 provinces. Despite localisation within DRC, there are emerging concerns about possibility of cross-border transmission [4]. With this perspective, and amidst shifting mpox epidemiology in a region with a high HIV prevalence, we highlight the threat posed to HIV positive patients, particularly those with unsuppressed viral loads. We argue that national and East and Central Africa regional health authorities must heighten efforts and fulfill their commitments to contain the epidemic in the region.

Following the issuance of the WHO strategic framework for enhancing the prevention and control of mpox (2024–2027) that emphasizes the importance of understanding the context specific uniqueness of regional mpox outbreaks [18], we set out to define the main features of the ongoing mpox outbreak in DRC, focusing on defining at risk groups and understanding the drivers of transmission.

While risk factors for sustained transmission and poor outcomes are still being delineated, socio-demographic factors such as age, sexual contact, and immune-modifying comorbidities appear to drive the disease burden in a population characterized by a young age structure, high prevalence of commercial sex workers, insecurity, malnutrition, and importantly, high HIV prevalence. For example, available data show that in the current outbreak, children are among the most affected (67%), and around 84% of the deaths occur in suspected cases under 15 years of age [4], likely a result of comorbidities like HIV and malnutrition. In the DRC, we have witnessed an ongoing and increased circulation of mpox disease characterised by unstable transmission dynamics, with a shift from being driven by men who have sex with men (MSM) towards possible heterosexual transmission largely linked to commercial female sexual workers [12]. The current outbreak in DRC is driven by Clade Ib, which is more virulent and transmissible and leads to more severe disease and higher mortality than Clade II (4.6% versus 0.3% in DRC and globally, respectively) [15,3].

It is established that mpox patients with a low CD4 cell count ( $< 100$  cells/mm<sup>3</sup>) suffer severe morbidity due to septicemia resulting from necrotising skin lesions, and pneumonia [11]. A mortality review and disease spread study highlighted most deaths occurred in mpox patients with a low CD4 count ( $< 200$  cells/mm<sup>3</sup>) [11]. Further, HIV has been found to be associated with an increased risk of contracting mpox infection [19], and mpox vaccines could be effective in lowering the risk of mpox infection in this high risk cohort. This is in keeping with the recommendations from a high regional level meeting on mpox that recommended deployment of vaccines as part of the intervention strategies to curtail the soaring outbreak in DRC [2]. However, the effectiveness of mpox vaccination in severe HIV immune deficiency is not known [11]. Severe immunodeficiency from HIV could potentially affect vaccine efficacy by driving variable immune responses [5].

South Africa recently reported 16 cases of mpox caused by the globally circulating Clade IIB variant; with 15/16 cases hospitalized, 11/16 people living with HIV with either unmanaged or only recently diagnosed HIV infection, and 3 fatalities all among people living with HIV [17]. In the current outbreak in DRC, HIV testing data among mpox cases is scanty, but the latest global outbreak data from WHO shows that of the mpox patients with a documented HIV status, 28.9% have HIV. During the 2022 multicountry outbreak, HIV-mpox co-infection was between 38–50% [11]. The increased transmission of mpox in South Kivu (777 mpox cases from January-June 2024) and North Kivu provinces, which border previously mpox-free countries including

Rwanda, Burundi and Uganda increases the risk of cross-border transmission to other East and Central African countries. The risk of transmission in these countries is exacerbated by the refugee influx to and from DRC, increased movements due to cross-border trade such as truck drivers, and increased mass movements due to insecurity [7].

The high prevalence of HIV in the East and Central African regions; the regions most affected by HIV/AIDS in the world, is a worrying statistic in the context of the current mpox outbreak. The East African region, together with the Southern region, is home to 53% of the people living with HIV globally [14]. Equally concerning is that countries in the Central and East Africa region are yet to meet targets for the Joint United Nations Programme on HIV/AIDS aims for HIV testing, treatment and viral suppression rates to be 95%–95%–95% by 2025 [6] (Table 1).

Despite limited routine HIV screening in DRC, the sustained and increasing transmission of the mpox disease outbreak is likely contributed by a combination of high HIV/AIDS prevalence and low proportion of HIV viral suppression (87.4%) among people living with HIV [13]. All this is happening in regions (Central and East Africa region) where only 90% of the people living with HIV (PLHIV) have viral suppression, a figure below the Joint United Nations Programme on HIV/AIDS target of 95% [16]. Countries in the East and Central Africa region are closely linked to the DRC, and viral suppression among PLHIV in this region is below the 95% target [16]. Data from Uganda shows a significant proportion of unsuppressed HIV individuals in the national HIV cohort, including in the Uganda-DRC border districts which receive and host refugees, in addition to serving as trade routes for truck drivers. In addition, PLHIV in the mid-western region of Uganda, a region adjacent to North Kivu have HIV viral suppression of 75.9%, and those in South Western region bordering Rwanda and DRC close to South Kivu, have a viral suppression of 82.8% according to the Uganda Population-based HIV impact assessment of 2020–2021 [10]. Given that commercial sexual activity is one of the biggest drivers of HIV in these regions, and the revelation of heterosexual transmission in the current outbreak in DRC where up to 29% of the cases are female sex workers [7], there is an imminent danger of double-edged health challenges. A high prevalence of HIV in the region, which is equally poorly controlled is a risk for severe disease and fatality.

Amidst the emerging public health threat, the joint regional approach has been suboptimal, with slow implementation of the recommendations of the Kinshasa Declaration of Ministers of Health from 13 African Member States [1]. In this context, we make several prepositions as part of the preparedness and response plans in the countries in the East and Central Africa region:

- (I) Africa Centres for Disease Control and WHO Regional Office for Africa to urgently operationalize the Joint Africa Task Force for mpox consistent with Kinshasa declaration on mpox.
- (II) Increased surveillance. The Ministries of Health in the region should activate border and intra-country surveillance systems in support of early detection of mpox cases mainly at HIV and sexual health clinics. At the community level, they should develop and disseminate mpox community case definition to enhance community-based surveillance (CBS), and this could be done through use of event-based surveillance (EBS) tools, capacity enhancement of community health care workers in detection, reporting of mpox

suspected cases, and sensitization of communities through dissemination of information, education and communication (IEC) materials in local languages among others.

- (III) Deployment of point of care diagnostics. As previously mentioned, HIV testing in the current outbreak in DRC is limited, which could compromise early institution of measures such as prompt treatment initiation of HIV treatment in the mpox cases. Rapid diagnostic testing kits for HIV offer several practical advantages in the current outbreak e.g. increased access, quick turnaround time and reduced reliance on the laboratories, all in a setting where already there are challenges with mpox testing (only 18 % of suspected cases are receiving a test) [15]. Similarly, point-of-care diagnostics for MPXV are needed to inspire early case detection and self-isolation.
- Institutionalise routine HIV testing among all mpox patients, including the contacts and the contacts of contacts. And use the findings to undertake targeted vaccination of these at-risk individuals.
  - The national HIV control programs should revisit their routine cohort screening criteria to include evaluation of exposure to mpox risks and mpox risky behaviour, and the presence of absence of mpox lesions.
  - Promote HIV self-testing at community level including self-testing among female sex workers, bar attendants.
- (IV) Targeted reactive vaccination and enhanced antiretroviral therapy of PLHIV and foreign nationals based in areas of active transmission in DRC to avert potential cross border transmission. Individuals with HIV have been suggested as priority for preventive mpox vaccination and antivirals [9].
- (V) Community engagement. The community is an integral part of the response and thus community engagement should continuously be done as it fosters bidirectional trust between the population and the health authorities. Community engagement counters fear, panic and rumours so as not to undermine the response efforts. Fear-related behaviors hampered the Ebola control efforts during the 2013–2016 Ebola outbreak in West Africa. The countries in the region should explore strategic partnership frameworks with key and influential stakeholders including the community, religious/opinion leaders, and civil society organisations among others.
- (VI) In the spirit of the April 2024 Kinshasa mpox declaration by the Ministers of Health, to foster capacity building of national rapid response teams in mpox care and management through insertion in DRC to work alongside their DRC counterparts to gain skills in clinical management of mpox cases mainly among immunocompromised individuals, community and facility level detection of mpox, sample collection techniques and field surveillance strategies mainly among asymptomatic individuals.

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### References

- [1] Africa CDC. 'United in the fight against mpox in Africa high-level emergency regional meeting'; 2024.
- [2] Africa CDC. 'United in the fight against mpox in Africa high-level emergency regional meeting'; 2024.
- [3] Alcamí A. Pathogenesis of the circulating mpox virus and its adaptation to humans. *Proc Natl Acad Sci USA* 2023;120(13):1–3. <https://doi.org/10.1073/pnas.2301662120>.
- [4] Cevik M, et al. The 2023 – 2024 multi - source mpox outbreaks of Clade I MPXV in sub - Saharan Africa: alarm bell for Africa and the World Affiliations: Division of Infection and Global Health Research, School of Medicine, University of St Institut National de Recher. *Int J Infect Dis* 2024;107159. <https://doi.org/10.1016/j.ijid.2024.107159>.
- [5] Geldmacher C, Koup RA. Pathogen-specific T cell depletion and reactivation of opportunistic pathogens in HIV infection. *Trends Immunol* 2012;33(5):207–14. <https://doi.org/10.1016/j.it.2012.01.011>.
- [6] Joint United Nations Programme on HIV/AIDS (UNAIDS). 'Understanding measures of progress towards the 95–95–95 HIV testing, treatment and viral suppression targets'; 2023; p. 1–2.
- [7] Katoto PD, et al. Shifting transmission patterns of human mpox in South Kivu, DR Congo. *Lancet Infect Dis* 2024;24(6). [https://doi.org/10.1016/S1473-3099\(24\)00287-1](https://doi.org/10.1016/S1473-3099(24)00287-1). e354–e355.
- [8] Kröger ST, et al. Mpox outbreak 2022: an overview of all cases reported to the Cologne Health Department. *Infection* 2023;51(5):1369–81. <https://doi.org/10.1007/s15010-023-01997-x>.
- [9] Mahase E. Mpox: Clinicians identify severe form with high mortality in advanced HIV patients. *BMJ (Clin Res Ed)* 2023;380(February):p422. <https://doi.org/10.1136/bmj.p422>.
- [10] Ministry of Health Uganda. 'Uganda population-based HIV impact assessment (UPHIA 2020–2021)', p. 2020–3.
- [11] Mitjà O, et al. Mpox in people with advanced HIV infection: a global case series. *Lancet* 2023;401(10380):939–49. [https://doi.org/10.1016/S0140-6736\(23\)00273-8](https://doi.org/10.1016/S0140-6736(23)00273-8).
- [12] Murhula Masirika L, et al. Mapping the distribution and describing the first cases from an ongoing outbreak of a New Strain of mpox in South Kivu, Eastern Democratic Republic of Congo between September 2023 to April 2024. *medRxiv* 2024. 2024.05.10.24307057 <<https://www.medrxiv.org/content/10.1101/2024.05.10.24307057v1>><<https://www.medrxiv.org/content/10.1101/2024.05.10.24307057v1.abstract>>.
- [13] Tendo C, et al. 'Task-shifting for viral suppression: piloting a collaborative case management approach to support unsuppressed people living with HIV at Wantanshi Health Center in the Democratic Republic of Congo'; 2022; p. 2022.
- [14] UNAIDS. 'Miles to go – the response to HIV in Eastern and southern Africa'; 2018; p. 58. Available at: <<http://www.unaids.org/en/resources/documents/2018/miles-to-go-eastern-and-southern-africa>>.
- [15] World Health Organisation. 2022–24 Mpox (Monkeypox) outbreak: global trends; 2024. Available at: <[https://worldhealthorg.shinyapps.io/mpx\\_global/](https://worldhealthorg.shinyapps.io/mpx_global/)> [Accessed 26 June 2024].
- [16] World Health Organisation. HIV data and statistics; 2024. Available at: <<https://www.who.int/teams/global-hiv-hepatitis-and-stis-programmes/hiv/strategic-information/hiv-data-and-statistics>> [Accessed 12 July 2024].
- [17] World Health Organisation. Multi-country outbreak of mpox, external situation report#34–28 June 2024; 2024. Available at: <<https://www.who.int/publications/m/item/multi-country-outbreak-of-mpox-external-situation-report-34-28-june-2024>> [Accessed 11 July 2024].
- [18] World Health Organisation. Strategic framework for enhancing prevention and control of mpox 2024–2027; 2024.
- [19] Yinka-Ogunleye A, et al. Mpox (monkeypox) risk and mortality associated with HIV infection: a national case-control study in Nigeria. *BMJ Glob Health* 2023;8(11):1–7. <https://doi.org/10.1136/bmjgh-2023-013126>.