

**MPOX OUTBREAK IN GHANA: EPIDEMIOLOGY, RESPONSE, AND LESSONS LEARNED.**

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**Author's contributions**

*This study was a collaborative effort of the authors. The authors reviewed and approved the final version of the manuscript for publication.*

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**ABSTRACT**

Mpox, caused by Mpox virus, has resurfaced and is causing a public health concern in Ghana. Since July 2022, new suspected and confirmed cases had been reported from various areas. By September 2025, Ghana had recorded the largest outbreak ever recorded, with all 16 regions of the country being affected. Data were extracted from Ghana Health Service Situation Reports (SITREP No. 42, 9 September 2025) surveillance updates and communication from the media. Descriptive epidemiology was used to summarize the case counts, demographics, geographic distribution and clinical outcomes. A literature review of World Health Organization (WHO) reports, New England Journal of Medicine (NEJM) and the Lancet and PubMed indexed studies (2022-2025) contextualized the results in Ghana to the outbreaks worldwide. As of September 9th, 2025, there had been 541 confirmed cases, 2,799 suspected cases and 1 death in Ghana. Of those, 452 were in recovery, three were still admitted to the hospital, and 85 were at home on isolation. A total of 2614 (83%) contacts followed up: 10 patients developed Mpox during follow-up. The outbreak has impacted all 16 regions with 97 of the 261 districts impacted, including Greater Accra and Western Regions. Both genders were affected, and all age groups (4yrs to >80yrs) were affected, but the majority were young adults(18-35yrs). Public health responses consisted of increased surveillance, laboratory scale-up (NPHRL, NMIMR, KCCR, with implementation of GeneXpert decentralization), special sensitization of high-risk populations and enhanced risk communication. The Mpox outbreak in Ghana provides evidence of a robust capacity for surveillance and multisectoral response but reveals important gaps in laboratory decentralization, the management of cases and the equitable availability of vaccination and therapeutic options. It is important that sustained investment in diagnostics, vaccination and engagement with the community is made for preparedness.

**Keywords:** Mpox; outbreak; Ghana; epidemiology; public health response; zoonotic disease; surveillance.

**INTRODUCTION**

Mpox (Monkeypox disease) is a zoonotic disease caused by an orthopoxvirus closely related to vaccinia and variola (smallpox) viruses (Yinka-Ogunleye *et al.*, 2019; Ogoina *et al.*, 2020). Human disease is characterized by a systemic prodrome (fever, malaise, lymphadenopathy) followed by the development of a vesiculopustular rash, and transmission may be made possible by animal-to-human contact, close to lesion or body fluid contact, respiratory droplet transmission in association with prolonged close contact, and fomites (Yinka-Ogunleye *et al.*, 2019). Historically, Mpox has triggered sporadic outbreaks in Central and West Africa, but since 2022, a multi-country outbreak of unprecedented size demonstrated the ability of the virus to rapidly spread outside endemic countries if introduced; this outbreak briefly caught cases all over Europe and the Americas (Ogoina *et al.*, 2020). Analysis of clinical and epidemiologic data in the period 2022-23 showed the high variations between settings with respect to these clinical data. Large case series from high-income countries characterized that in very early stages, clustering of cases was seen among particular social and sexual networks (dominantly adult men who have sex with men), and that coinfection with or advanced HIV disease were vulnerable for more-severe disease (Philpott *et al.*, 2022; Thornhill *et al.*, 2022). In contrast, previous outbreaks reported in West Africa (e.g. Nigeria 2017-2018) and most recent reports in African settings have reported broader age and sex distributions and a greater contribution of household and community-line transmission and zoonotic canaries (Ogoina *et al.*, 2020; Yinka-Ogunleye *et al.*, 2019). Together, these very different epidemiologic Schwartz Rounds evidently suggest the strategic need for context-based surveillance and control interventions.

The number of available intervention options sharply increased after 2022. Since 2022, JYNNEOS/Imvanex/Imvamune (hereafter "Mpox vaccine"), the non-replicating variant of the vaccine, has shown in a post-marketing setting, particularly after a 2-dose schedule, lesser permeability to Mpox pathology, and single-dose efficacy values have ranged from study to study but generally have shown substantial efficacy in many pooled studies (Bertran *et al.*, 2023; Payne *et al.*, 2022). Tecovirimat (TPOXX) has been administered under compassionate or emergency use; recent randomized clinical trials have reported conflicting results on impact of antivirals on lesion duration and clinical resolution based on viral clade and disease severity, but seem to be safe (Adler *et al.*, 2022; Reynolds *et al.*, 2023). Ghana saw cases of Mpox in 2022 and has been on surveillance ever since (Ogoina *et al.*, 2020). The increase observed in 2025, with prevalence across all 16 regions, with extension down to dozens of districts and hundred verified cases (Ogoina *et al.*, 2020), however, occurred under the context of evolving international data concerning transmission, vaccination, treatment and outbreak controls. This manuscript uses the national data in SITREP (SITREP No. 42, 9 Sep 2025) and more recent literature to describe the outbreak, review public health response measures and highlight priorities for control and research in the context of Ghana.

## METHODS

Data sources: Ghana Health Service SITREP No. 42 (9 September 2025), official press releases and peer-reviewed literature. Case definitions: According to the World Health Organization, Mpox cases are classified into suspected, probable, and confirmed categories to standardize surveillance and outbreak reporting (WHO, 2022). Laboratory testing must be conducted in an accredited laboratory (WHO, 2022). Suspected case was defined as any person of any age with an unexplained acute skin rash and with at least one sign of either fever  $>38.5^{\circ}\text{C}$ , headache, swollen lymph nodes, muscle aches, back pain or weakness; or a rash illness for which other common causes (chickenpox, measles, syphilis, bacterial skin infections or drug reaction) had been excluded. A probable case is a suspected case with epidemiological link within 21 days prior to the development of symptoms, including close contact with a confirmed case, travel to or other residence in an area with reported Mpox cases, exposure to wild animals or bushmeat in endemic setting, contact with contaminated objects used by a case and multiple or anonymous sexual partners during an outbreak. A confirmed case is a suspected or probable case with laboratory confirmation of Mpox virus infection through: Polymerase Chain Reaction (PCR), sequencing or virus isolation conducted in accredited Ghanaian laboratories such as the National Public Health Reference Laboratory (NPHRL), Noguchi Memorial Institute for Medical Research (NMIMR) and the Kumasi Centre for Collaborative Research (KCCR) was obtained.

## Data Analysis

Data analysis was carried out using descriptive methods of epidemiologic studies to characterize deaths that occurred in Mpox outbreak in Ghana. Epidemic curves that showed the temporal trends of cases were summarized according to time, place (regional and district dispersion), and person (age, sex, and clinical outcome). Frequencies, proportions and case fatality rates were determined to describe the magnitude and impact of the outbreak. Contact tracing data was also analyzed in terms of contacts identified, successfully followed and converted into a confirmed case during the follow up process. In order to put the Ghanaian outbreak in an appropriate global context there was a comparative literature review. Peer-reviewed articles from 2022 to 2025 have been retrieved from PubMed and had been supplemented with reports from the World Health Organization (WHO), as well as high impact journals that is, The New England Journal of Medicine & The Lancet. This comparative review uncovered some similarities and differences in the epidemiological patterns, clinical outcomes, transmission dynamics and public health responses between Ghana and other affected countries as in Table 1.

### **Data Management & Data Quality Assurance**

Data were obtained from Ghana Health Service Situation Reports (SITREPs), Case Investigation Forms and Laboratory confirmation reports from the National Public Health Reference Laboratory (NPHRL), Noguchi Memorial Institute for Medical Research (NMIMR) and the Kumasi Centre for Collaborative Research (KCCR). All cases records have been reviewed by trained surveillance officers to ensure that completeness and consistency have been achieved before entering the national surveillance database.

Data cleaning was carried out to check duplicate data, missing values, and internal inconsistencies in the data. Where the discrepancies were found, clarifications were experienced from the district and regional surveillance teams. Only cases meeting standard case definitions by the Ghana Health Service for suspected, probable and confirmed Mpox were included in an analysis.

Quality assurance was ensured further by the regular meetings held on national and regional levels involving validation of aggregated data and comparison with district reports. Laboratory results have been checked in an accredited laboratory before categorizing confirmed cases. These measures ensured the data used for analysis was reliable and was also representative of the outbreak situation in Ghana.

### **RESULTS**

As of September 9th, 2025, there have been a cumulative total of 541 confirmed Mpox cases and 2,799 suspected cases in Ghana since Mpox was first detected in the country in 2022, making it the biggest outbreak to date. A total of 452 people were recovered; 3 patients were still in hospitals, and 85 people were being monitored in home isolation. Only one death had been recorded during this outbreak, which corresponds to a case fatality rate of 0.2% ( $1/541 \times 100$ ), which is relatively low compared with outbreaks in other parts of Africa. The outbreaks exhibited an increasing number of cases within time. Weekly trends showed a consistent rise in both suspected and confirmed cases from May to being followed by a sharp increase between July and September 2025 (Figure 1). This pattern accentuates this intensification of transmission in the second half of the year. Geographically, it was a widespread outbreak, with confirmed infections reported from every one of the 16 regions of the country. In total, 97 out of 261 districts had at least one confirmed case with Greater Accra, Ashanti and Western Regions amongst the most affected. The distribution at district-level is presented in Figure 2 by which it can be seen both urban centers and the peri-urban districts were significantly affected. Of significant note, the Asene Manso Akroso District in the Eastern Region saw a new area affected during this reporting period which further demonstrates the geographic spread of the outbreak.

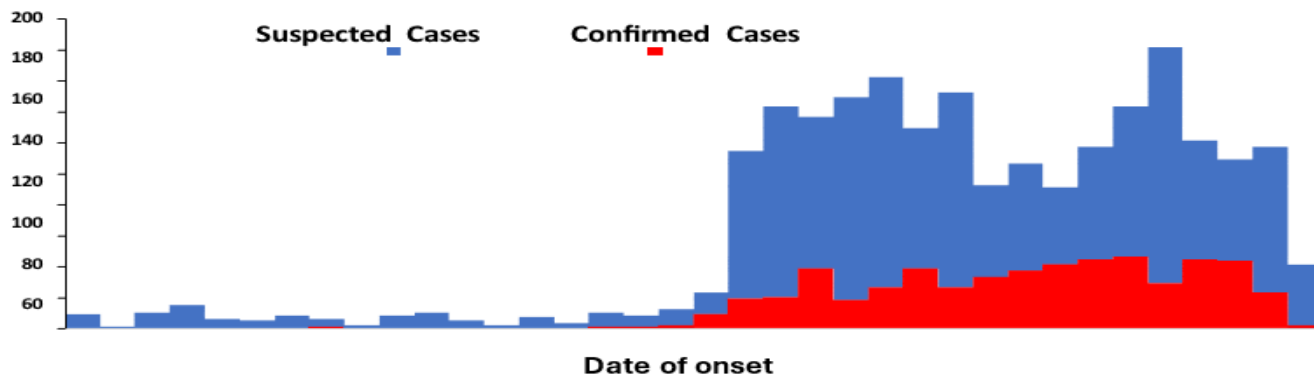


Fig.1: Suspected and Confirmed cases of Mpox in Ghana by Epi week, 2025

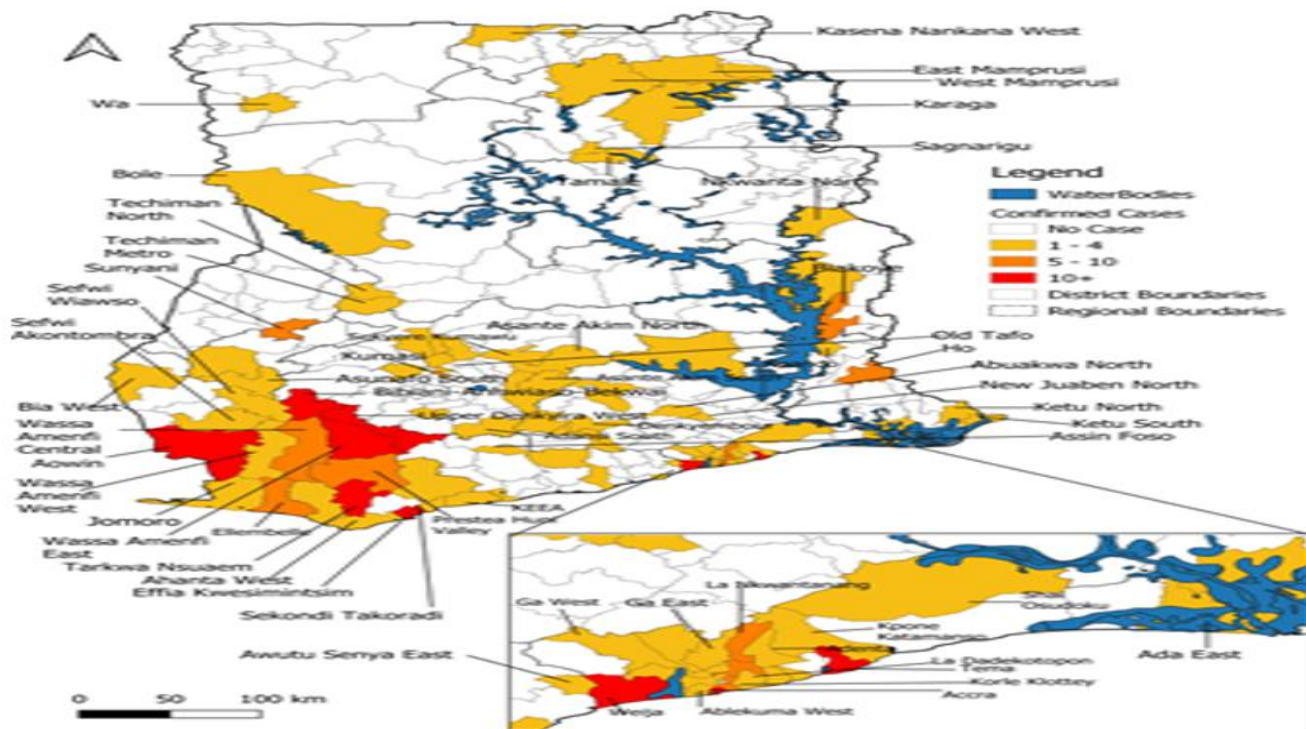
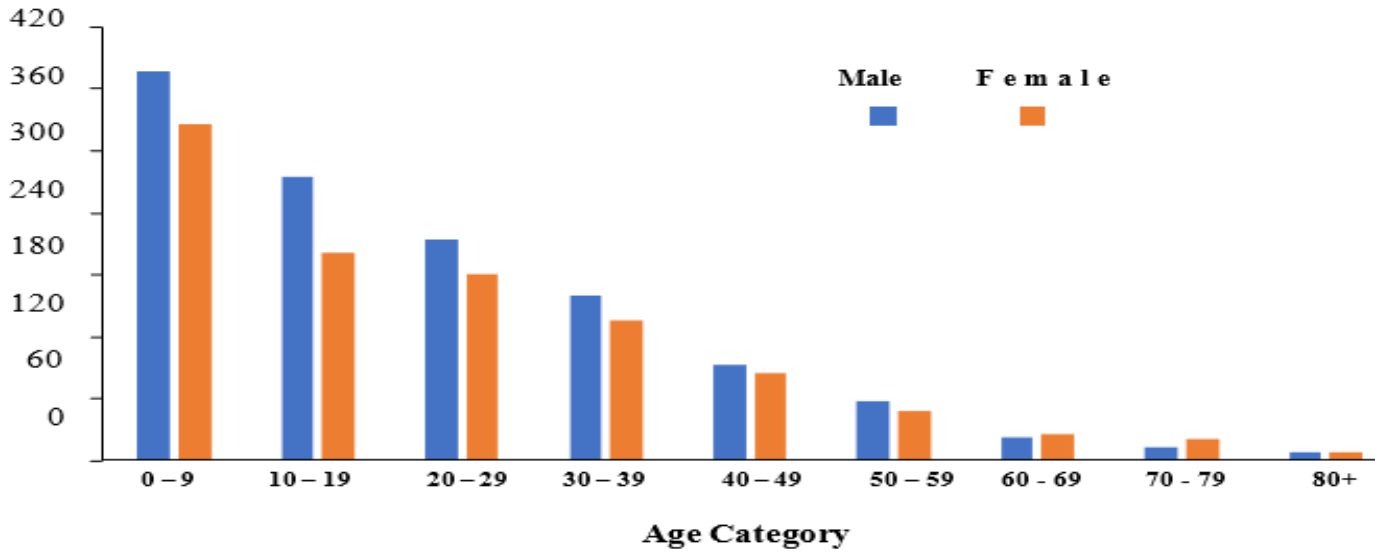
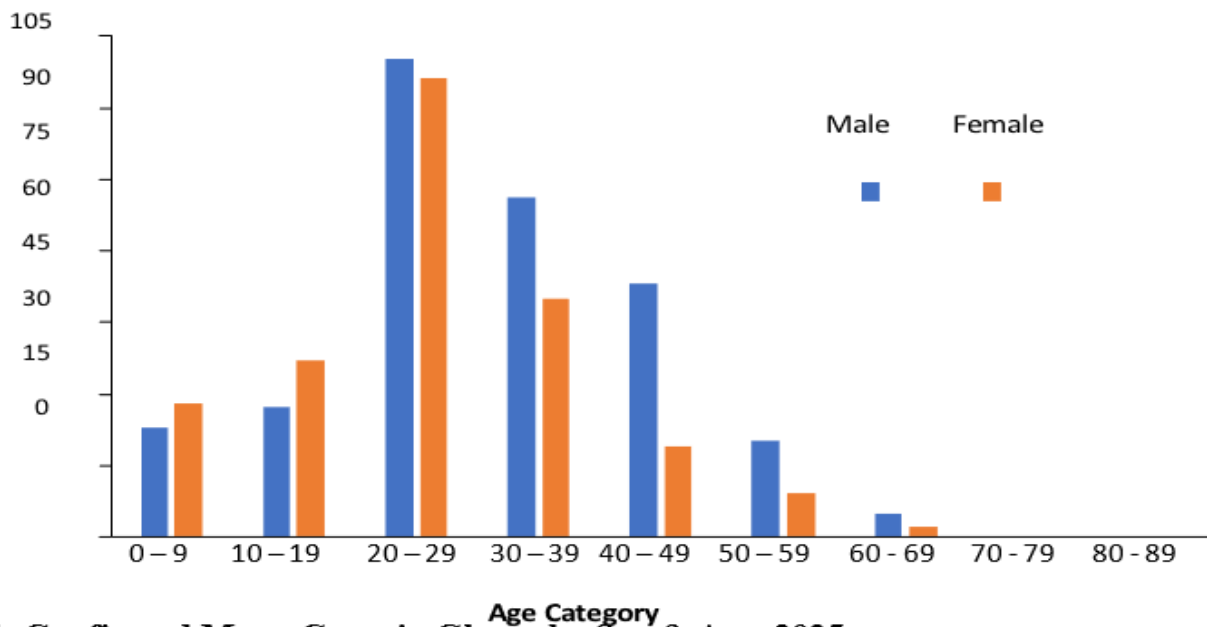


Fig.2: Confirmed Mpox cases in Ghana by District, 2025

Demographically, Mpox cases were found among both sexes of all age-group, from 4-80+ years. Most suspected cases were clustered in young adults 18-35 years of age, but every age was affected (Figure 3). The confirmed cases followed a similar demographic pattern with slightly more cases in males than females for most age categories (Figure 4). These findings are in line with observations during epidemiological study of other West African outbreaks, and at the same time are different from the derived demographic profiles of Europe and the Americas during (2022-2023) global outbreak.



**Fig.3: Suspected Cases of Mpox Cases in Ghana by Sex & Age, 2025**



**Fig.4: Confirmed Mpox Cases in Ghana by Sex & Age, 2025**

Contact tracing activities were intensive with a total of 3220 contacts identified across the country. Of this, 2,614 persons had successfully completed follow up while 10 persons developed Mpox as they were being monitored, confirming a continued transmission in the community. This shows how effective the Ghana surveillance system is at identifying the secondary cases using the household and community networks. In general, the findings suggest that the 2025 Mpox outbreak in Ghana is characterized by a large geographic scale, a large distribution of cases populationally, and the high rate of case fatality along with the effective response to this outbreak using the public health framework characterized by intensive contact tracing and follow-up.

**DISCUSSION**

The Mpox outbreak in Ghana, more than 500 cases in all the 16 regions, represents a crossroads between increasing transmission and increasing detection of cases. Our results are alike with global and regional findings in several and show programmatic issues distinctive for Ghana. First, the demographic profile for the Ghana outbreak broad age distribution, affecting both sexes, and concentration in young adults is like that from multiple outbreaks in Africa (Ogoina *et al.*, 2020; Yinka-Ogunleye *et al.*, 2019). This contrasts with the beginning of 2022 outbreaks in the high-income countries, where infections were mainly concentrated among adult males in particular sexual networks (Thornhill *et al.*, 2022). The pattern in Ghana attests to the importance of household and community exposures as the main drivers of transmission and underscores the importance of broad-based interventions for communities, rather than targeted interventions for defined groups at increased risk of infection. Second, the CFR and clinical severity in Ghana (1 death among 541 confirmed cases, SITREP No. 42) resembles the decreasing levels of mortality seen in the Democratic Republic of Congo [DRC], where Clade I infections were associated with higher levels of fatality historically (Guagliardo SA, *et al.*, 2020: WHO, 2022). However, the immune compromised continues to be vulnerable: cross-country reports consider severe disease of Mpox associated with uncontrolled HIV infection (Philpott *et al.*, 2022). This highlights the importance of combining Mpox response with HIV services, including testing and HIV care.

Third, in Ghana, intensive contact tracing (with 3,220 contacts having been identified, 2,614 of whom finished 21-day follow-up) bolster international evidence of the epidemiological importance of household secondary attack rates, despite their moderate size. From UK polled estimates the estimated secondary attack rates of 4% of households is approximately 4% (Madewell ZJ, *et al.*, 2020). The finding that 10 traced contacts subsequently tested positive underscores the persistence of household/community transmission and validates research to solve the importance of close monitoring to allow for early detection and disruption of transmission chains. Fourth, access to vaccines remains to be a challenge. International data confirm proof of principle that JYNNEOS vaccination (especially 2-dose regimens) reduces the risk and severity of Mpox (Payne AB, *et al.*, 2022: Bertran M. *et al.*, 2023). However, estimates of vaccine effectiveness (VE) still lack uniformity and access worldwide is inequitable. Ghana's response to the outbreak involved non-pharmaceutical interventions (isolation, contact tracing, and risk communication) only, which are a resource-intensive option. In line with WHO recommendations, ring vaccination and targeted pre-exposure vaccination of high-risk populations should be given priority once vaccine will be available (WHO, 2022). Fifth, therapeutic evidence around tecovirimat continues to change. Clinical studies suggested safety although effects on lesion healing and duration of illness are inconsistent depending on viral clade, severity of illness and time of treatment (Adler H, *et al.*, 2022: O'Shea J, *et al.*, 2022). For Ghana, although there is potential benefit of tecovirimat for severe or immunosuppressed patients, procurement decisions considering emerging trials information, WHO recommendations and good stewardship should be considered. Sixth, laboratory and surveillance strengthening are still the key elements for outbreak control. WHO and Pan American Health Organization (PAHO) emphasize the importance of decentralization of the diagnostics and reduction of the turnaround time (PAHO, 2022). Ghana has increased the practice of using GeneXpert platforms to test for Mpox following global recommendations. This strategy promises to more rapidly report and optimally respond. In addition, genomic surveillance should be extended to track viral lineages and evolution which can have an influence on transmissibility and severity (Isidro J, *et al.*, 2022).

Finally, operational research priorities are as follows: (1) VE studies of tecovirimat and JYNNEOS among African populations; (2) household transmission studies and transmissions among caregivers, household structures and animal contact; (3) implementation research regarding tecovirimat-supported ring vaccination and stigma-reducing community-engagement strategies; and (4) pragmatic trials or registry studies among African clades, immunocompromised populations and severe cases of disease (Reynolds MG, *et al.*, 2023: Petersen E, *et al.*, 2023).

In conclusion, the Ghana 2025 outbreak has proved that the strength of traditional public health instruments (surveillance, contact tracing, risk communication) remain effective, when properly implemented as soon as possible. However, equitable access to vaccines, combination of antivirals, decentralized diagnostics, and context-sensitive operational research based on African settings are needed for long-term Mpox control.

## Limitations

The data is reliant on SITREPs and can underrepresent the more distant cases. No previous genomic sequencing data available showing clade type in Ghana. Only publicly available datasets are limited in terms of their age/sex disaggregation.

**CONCLUSION**

The outbreak of Mpox in Ghana has achieved an unprecedented size and expanded to all regions with low mortality. The response has a good level of coordination, but important gaps are still in the diagnostics, vaccination and therapeutics. Ensuring access to vaccines/antivirals and strengthening health system resilience are extremely important to preparedness.

**Recommendations**

1. Expand laboratory capacity by decentralizing diagnostics to regional GeneXpert platforms.
2. Secure vaccines (JYNNEOS) and establish protocols for high-risk groups.
3. Evaluate access to antivirals (tecovirimat) through global partnerships.
4. Enhance risk communication with tailored messaging for diverse community settings.
5. Invest in genomic surveillance to characterize circulating Mpox strains.

**Conflict of Interest**

The author reports that he has no competing interests.

**Author Contribution**

Simon Aabalekuu conceived and designed the study, conducted the literature review, collected and analyzed the data, and drafted the manuscript. He critically reviewed and approved the final version for submission and takes full responsibility for the integrity and content of the work.

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**Table 1. Comparison of Mpox Outbreak in Ghana and Global Literature (2022–2025)**

Domain	Ghana (2025)	Global Findings (2022–2025)	References
Geographic spread	Cases in all 16 regions, >500 confirmed	Early 2022 outbreaks in Europe/United State (US) clustered in cities; Africa reported wider community spread	Yinka-Ogunleye A, et al.,2019
Demographics	Wide age distribution, both sexes, concentration in young adults	Africa: similar broad distribution Europe/US 2022: mostly Men Who Have Sex with Men (MSM) networks	Ogoina D, et al.,2020: Thornhill JP, et al.,2022
Transmission	Mainly household & community exposure; 10/3,220 contacts became cases	Europe/US: sexual networks dominated ; Africa: household/community & zoonotic	Yinka-Ogunleye A, et al.,2019: Guagliardo SA, et al.,2020

Severity & mortality	1 death/541 cases (CFR 0.2%)	Clade II: low Case Fatality Rate (CFR) (<1%); historic Clade I (DRC) CFR up to 10%	Ogoina D, et al.,2020: Guagliardo SA, et al.,2020
Risk groups	Severe disease noted in immunosuppressed (e.g., HIV)	Same pattern globally — uncontrolled Human Immunodeficiency Virus (HIV) increases severity	Philpott D, et al.,2022
Vaccination	No vaccine available; relied on NPIs (isolation, contact tracing, RCCE)	JYNNEOS effective, especially 2 doses; ring vaccination adopted in Europe/United State	Payne AB, et al.,2022
Antiviral (Tecovirimat)	Not widely available; policy interest for severe/immunocompromised cases	Safe, but mixed effect on lesion healing and duration; clade- and timing-dependent	Adler H, et al.,2022: O’Shea J, et al.,2022
Contact tracing	3,220 contacts; 2,614 completed follow-ups; 10 new cases detected	Household Secondary Attack Rate (SAR) ~4%; intimate/close contact increases risk	Madewell ZJ, et al.,2020
Diagnostics	Expanded GeneXpert use; decentralization improved turnaround	World Health Organization (WHO)/ Pan American Health Organization (PAHO) recommend decentralized testing & genomic surveillance	Isidro J, et al.,2022:PAHO,2022
Research priorities	VE studies in African populations, household/community transmission, stigma reduction, HIV integration	Pragmatic clinical trials, African clade data, Vaccine Effectiveness (VE) /Post-Exposure Prophylaxis (PEP) studies, genomic surveillance	Isidro J, et al.,2022

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