

## Review

# Implementation of a Multi-Phase Diagnostic Strategy for Mpox Detection and Public Health Control in Burundi

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## Abstract

Mpox remains an important public health threat in several African countries, with recurrent outbreaks highlighting the need for decentralized and scalable diagnostic systems. During the 2024–2025 Mpox outbreak in Burundi, reliance on a single National Reference Laboratory limited timely diagnosis, reduced surveillance efficiency, and delayed outbreak response activities. This study describes and evaluates the implementation of a national strategy for decentralizing and expanding Mpox diagnostic capacity across Burundi. A descriptive implementation study was conducted between August 2024 and July 2025. Burundi implemented a four-phase diagnostic scale-up strategy that expanded Mpox testing services from one centralized laboratory to 56 decentralized GeneXpert-equipped laboratories, including mobile laboratory units. The implementation phases comprised strategic planning and risk mapping, pilot deployment at the national level, regional expansion, and extension to peripheral district laboratories. Key interventions included healthcare workforce training, strengthening laboratory supply chains, deployment of mobile diagnostic units, and integration of laboratory information into the national surveillance system. Program performance was assessed using indicators of laboratory network expansion, testing coverage, diagnostic turnaround time, and confirmed case detection. Following implementation, the number of operational Mpox diagnostic sites increased from 1 to 56, representing a 5500% expansion in testing capacity. National testing coverage approached 100%, substantially improving geographical access to diagnostic services. Weekly confirmed Mpox case detection increased by 496%, reflecting enhanced surveillance sensitivity and improved case identification. Diagnostic turnaround time decreased from 24–72 h under the centralized model to 2–4 h following decentralization. The expanded diagnostic network facilitated earlier case confirmation, more rapid isolation of infected individuals, strengthened surveillance activities, and accelerated implementation of outbreak control measures. The phased decentralization of Mpox diagnostics using existing GeneXpert infrastructure and mobile laboratories substantially improved testing access, reduced diagnostic delays, and strengthened outbreak response capacity in Burundi. This approach demonstrates a practical, scalable, and cost-effective model for enhancing epidemic preparedness and building resilient diagnostic systems in resource-constrained settings. Similar strategies could support improved detection and control of Mpox and other emerging infectious diseases across Africa and comparable low-resource environments.



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## 1. Background

Mpox (formerly known as monkeypox) is a zoonotic viral disease caused by the monkeypox virus, an Orthopoxvirus closely related to the variola virus that causes smallpox. The disease was first identified in humans in 1970 in the Democratic Republic of the Congo (DRC) and has since remained endemic in several Central and West African countries [1]. Historically, Mpox transmission was associated with contact with infected wildlife and occurred predominantly in rural forested communities with limited healthcare access. Clinical manifestations include fever, lymphadenopathy, and a characteristic vesiculopustular rash, with disease severity ranging from mild self-limiting illness to severe complications and death, particularly among children and immunocompromised individuals [2]. Over the past two decades, increasing human-to-human transmission, environmental changes, declining population immunity following cessation of smallpox vaccination, and population mobility have contributed to the re-emergence and geographic expansion of the disease [3].

The global epidemiology of Mpox changed substantially during the 2022 multinational outbreak, which represented the largest recorded spread of the disease outside Africa. By the end of 2023, more than 87,000 confirmed cases and over 140 deaths had been reported across more than 110 countries and territories worldwide [4]. Regions such as Europe, North America, Latin America, Asia, and Oceania experienced sustained community transmission despite having no previous history of endemic Mpox circulation [5]. In response, many high-income countries rapidly strengthened surveillance systems, laboratory diagnostic capacity, contact tracing, and vaccination strategies. The United States alone reported more than 30,000 confirmed cases and expanded nationwide molecular testing through public health and commercial laboratories [6]. Similar containment measures were implemented in Canada, Australia, and several European countries through coordinated risk communication, targeted vaccination campaigns, and rapid diagnostic deployment [7].

Despite being the historical center of Mpox transmission, African countries accounted for a disproportionately low proportion of laboratory-confirmed cases during the global outbreak. This discrepancy largely reflected under-detection caused by limited access to molecular diagnostics, weak surveillance systems, inadequate specimen transport networks, and shortages of trained laboratory personnel [8]. Several endemic countries relied heavily on centralized reference laboratories, resulting in delayed case confirmation and incomplete reporting. Consequently, the true burden of Mpox in Africa was likely substantially underestimated during the global outbreak period [9]. These diagnostic and surveillance gaps highlighted long-standing inequities in global outbreak preparedness and emphasized the urgent need for decentralized laboratory systems in resource-constrained settings.

The Democratic Republic of the Congo has remained the country most affected by Mpox globally and continues to experience recurrent outbreaks with sustained community transmission. In 2022, the DRC reported more than 5000 suspected Mpox cases; however, only approximately 5.5% were laboratory-confirmed due to limited diagnostic capacity and inadequate access to testing services [10]. The country faced multiple operational challenges, including insufficient laboratory infrastructure, delayed specimen transportation from remote provinces, insecurity in outbreak-affected regions, and shortages of diagnostic reagents [11]. These limitations hindered rapid outbreak detection and delayed implementation of public health interventions such as isolation, contact tracing, and infection

prevention measures. The epidemiological situation in the DRC also posed a significant regional threat because of extensive cross-border population movement with neighboring countries, including Burundi, Rwanda, and Uganda [12].

In response to the increasing regional spread of Mpox, the Africa Centres for Disease Control and Prevention (Africa CDC) and the African Union intensified continental preparedness and response efforts. In August 2024, the African Union officially declared Mpox a Public Health Emergency of Continental Security (PHECS), recognizing the growing public health threat across the continent [13]. Between August 2024 and July 2025, more than 37,600 confirmed Mpox cases and 263 deaths were reported across 28 African Union Member States [14]. During this period, continental diagnostic coverage improved progressively to an estimated 53–67% through support for laboratory expansion, workforce training, and deployment of mobile diagnostic units. Nevertheless, substantial disparities in diagnostic access and surveillance performance persisted between countries [15].

Burundi confirmed its first Mpox cases in July 2024 in the provinces of Bujumbura and Gitega, prompting the Ministry of Public Health and the Fight against AIDS to declare a national public health emergency [16]. At the onset of the outbreak, Mpox diagnosis relied exclusively on the National Reference Laboratory located in Bujumbura. This highly centralized testing model created significant operational bottlenecks, including prolonged turnaround times, delayed case confirmation, restricted testing access for peripheral provinces, and increased logistical costs associated with specimen transportation [17]. Although GeneXpert molecular platforms were already available in several district laboratories through tuberculosis and HIV programs, these existing resources had not yet been integrated into the national Mpox response strategy [18].

To overcome these challenges, Burundi implemented a multi-phase strategy to decentralize Mpox diagnostic services beginning in November 2024, with technical support from Africa CDC and international partners. The strategy aimed to progressively expand testing capacity from a single national laboratory to a nationwide network of decentralized GeneXpert-equipped laboratories and mobile diagnostic units. Key interventions included laboratory workforce training, strengthening of supply chain systems, integration of laboratory data into national surveillance platforms, and deployment of mobile laboratories to underserved areas [19]. This field investigation describes the design, implementation, and outcomes of Burundi's phased diagnostic decentralization strategy and evaluates its contribution to improving Mpox surveillance, outbreak detection, and public health responses in a resource-limited setting.

## 2. Methods

### 2.1. Study Design and Setting

This investigation was conducted as an operational field investigation during the Mpox outbreak response in Burundi between July 2024 and July 2025. The purpose of the study was to document and evaluate the implementation of a decentralized laboratory diagnostic strategy designed to improve Mpox case detection, surveillance coverage, and outbreak control. The study used a descriptive epidemiological and operational evaluation design, combining routine surveillance data analysis with an assessment of the progressive expansion of the national laboratory network. The response was coordinated by the Ministry of Public Health and the Fight against AIDS with technical support from the Africa Centres for Disease Control and Prevention following the declaration of Mpox as a Public Health Emergency of Continental Significance by the African Union in August 2024 [1,2].

## 2.2. Case Definition and Case Finding

Standardized Mpox case definitions were adopted from national surveillance guidelines and international outbreak response recommendations [1–3]. A suspected case was defined as any individual presenting with an acute onset of fever followed by a vesicular or pustular rash and lymphadenopathy or other symptoms compatible with Mpox infection. A probable case referred to a suspected case with epidemiological linkage to a confirmed case or exposure to a high-risk environment. A confirmed case was defined as a suspected or probable case with laboratory confirmation of Mpox virus infection using polymerase chain reaction (PCR). Case finding relied on both passive and active surveillance mechanisms, including routine reporting through the Integrated Disease Surveillance and Response (IDSR) system, active case searches in health facilities, contact tracing, and community-based reporting by trained health workers.

## 2.3. Data Sources and Data Collection

Data were obtained from multiple sources, including health facility registers, laboratory information systems, case investigation forms, and national Mpox surveillance databases. Additional information was gathered through structured case investigation interviews, review of laboratory records, and surveillance reports submitted by district health authorities. Variables collected included demographic characteristics (age, sex, residence), clinical symptoms, dates of symptom onset, exposure history, laboratory results, and geographic location of cases. These data were compiled into the national Mpox surveillance database and used to monitor outbreak trends and evaluate the performance of the decentralized diagnostic system.

## 2.4. Laboratory Methods and Data Analysis

Clinical specimens were collected from suspected Mpox cases according to national diagnostic protocols [3,4]. Sample types included lesion swabs, crust samples from skin lesions, and oropharyngeal swabs where appropriate. Specimens were transported under cold chain conditions to designated laboratories for testing. Laboratory confirmation was performed using PCR assays, primarily conducted on the GeneXpert system platform after decentralization of diagnostic services. The diagnostic workflow included sample registration, nucleic acid amplification, detection, and electronic reporting of results through the national laboratory information system. Data were analyzed using descriptive epidemiological methods to assess trends in Mpox detection and laboratory performance. Key indicators included the number of operational testing laboratories, samples collected and tested, confirmed Mpox cases, geographic coverage of testing services, and turnaround time from sample collection to result reporting. Analyses were conducted by time, place, and person to compare surveillance performance before and after the implementation of the decentralized laboratory strategy. Table 1 outlines Burundi's four-phase Mpox diagnostic strategy, beginning with national planning and risk mapping, followed by a pilot rollout in high-priority sites, regional scale-up to affected districts, and finally peripheral and cross-border expansion to pre-empt outbreaks. Each phase progressively expanded laboratory capacity, deployed GeneXpert platforms and mobile labs, trained personnel, and strengthened surveillance systems, ultimately achieving nationwide district-level coverage and improved outbreak readiness.

**Table 1.** Mpox diagnostic strategy summary table stratified by phase.

| Phase                                          | Focus Area                                    | Key Activities                                                                                                                                                                                                                                                | Target Areas                        | Key Outputs                                                                                                                                                                |
|------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Phase 1<br>Planning and Risk Mapping           | Situation analysis & strategic planning       | <ul style="list-style-type: none"> <li>- Assess HR capacity, lab readiness, and road network</li> <li>- Map stakeholders</li> <li>- Select diagnostic platform (GeneXpert)</li> <li>- Tier districts by risk</li> </ul>                                       | Nationwide (risk mapping)           | <ul style="list-style-type: none"> <li>- National Plan finalized</li> <li>- 3-tier district risk classification</li> <li>- Platform selection complete</li> </ul>          |
| Phase 2<br>Pilot Rollout (National Level)      | Initial implementation in high-priority sites | <ul style="list-style-type: none"> <li>- Deploy GeneXpert in Bujumbura, Ngozi, Gitega</li> <li>- Train staff</li> <li>- Supply POC tests &amp; consumables</li> <li>- Establish sample referral and feedback systems</li> <li>- Deploy mobile labs</li> </ul> | High-risk districts                 | <ul style="list-style-type: none"> <li>- Diagnostic services are operational in 3 provinces</li> <li>- Sample circuit and algorithm functional</li> </ul>                  |
| Phase 3<br>Regional Scale-Up                   | Extend coverage to other affected districts   | <ul style="list-style-type: none"> <li>- Reposition or install new GeneXpert units</li> <li>- Continue mobile lab outreach</li> <li>- Strengthen supply logistics</li> <li>- Establish regional sample/waste management systems</li> </ul>                    | Newly affected regions              | <ul style="list-style-type: none"> <li>- Increased regional diagnostic coverage</li> <li>- Supply chain is functional at the district level</li> </ul>                     |
| Phase 4<br>Peripheral & Cross-Border Readiness | Pre-emptive deployment to at-risk zones       | <ul style="list-style-type: none"> <li>- Identify high-mobility, cross-border zones</li> <li>- Train local staff</li> <li>- Expand lab network</li> <li>- Introduce community-level diagnostics</li> <li>- Support surveillance at borders</li> </ul>         | Peripheral & cross-border districts | <ul style="list-style-type: none"> <li>- 100% district-level coverage</li> <li>- Enhanced community ownership</li> <li>- Strengthened cross-border alert system</li> </ul> |

### 2.5. Ethics Considerations

This study was conducted as part of the national mpox outbreak response and routine public health surveillance activities led by the Ministry of Public Health and the Fight against AIDS in Burundi. In accordance with national regulations and international outbreak investigation guidelines, formal Institutional Review Board approval was not required, as the analysis relied on aggregated, anonymized surveillance data with no personal identifiers. The study was conducted within the broader continental mpox emergency framework, following the Africa CDC declaration of mpox as a Public Health Emergency of Continental Security (13 August 2024) and the World Health Organization declaration of a Public Health Emergency of International Concern (14 August 2024).

## 3. Results

### 3.1. Descriptive Findings

#### Response Rates and Case Identification

During the study period (July 2024–July 2025), a total of 8885 suspected Mpox cases were reported across Burundi. Of these, 3656 cases met the standardized case definition for

probable or confirmed Mpox infection, representing a high response rate for case reporting and investigation due to active community and facility-based surveillance. The overall attack rate (AR) for the outbreak was estimated at 0.25% of the national population. Table 2 summarizes surveillance indicators before and after the decentralization strategy was applied. Before August 2024, the system recorded 210 suspected cases, with 210 samples collected and tested (100% testing rate and coverage), resulting in 80 positive samples and a 38% test positivity rate. After decentralization (August–December 2024), surveillance expanded dramatically to 5767 suspected cases, 5743 samples collected, and 5710 tested, maintaining 99–100% testing performance while identifying 2975 positive samples and increasing test positivity to 51%. From January–May 2025, high performance continued, with 2908 suspected cases and samples tested, 601 positives, and a 47% positivity rate, indicating sustained surveillance capacity and continued detection of transmission.

**Table 2.** Surveillance indicators pre- and post-application of the Decentralization Strategy.

| Metric            | Before August 2024 | August–December 2024 | January–May 2025 | Change/How                                                     |
|-------------------|--------------------|----------------------|------------------|----------------------------------------------------------------|
| Suspected cases   | 210                | 5767                 | 2908             | 496%<br>↑(increased)—stronger surveillance & reporting         |
| Samples collected | 210                | 5743                 | 2908             | Matches suspected cases (100% collection rate)                 |
| Samples tested    | 210                | 5710                 | 2908             | Demonstrates scaled system capacity                            |
| Testing rate      | 100%               | 99.4%                | 100%             | Sustained high performance                                     |
| Testing coverage  | 100%               | 99.0%                | 100%             | High coverage maintained                                       |
| Positive samples  | 80                 | 2975                 | 601              | ↑(increased) due to transmission and/or better detection       |
| Test positivity % | 38%                | 51%                  | 47%              | ↑(increased) 9%—intensified transmission or improved targeting |

3.2. Distribution by Time

The epidemic curve showed an initial surge of suspected cases following the first confirmed cases in July 2024, peaking in October 2024, followed by a steady decline after implementation of the decentralization strategy and enhanced surveillance measures. The phased laboratory expansion coincided with improved case detection and more timely reporting, highlighting the impact of enhanced diagnostic capacity on outbreak monitoring.

3.3. Distribution by Place

Cases were initially concentrated in the provinces of Bujumbura and Gitega, with subsequent spread to high-mobility districts and cross-border regions. Attack rates were highest in urban centers, reaching 0.5% in Bujumbura, which can be compared with 0.1–0.2% in rural districts, reflecting differences in healthcare access and diagnostic availability.

3.4. Distribution by Person

The median age of confirmed cases was 26 years (range: 2–67), with 55% male cases. Clinical features included fever (100%), vesicular or pustular rash (92%), lymphadenopathy

(78%), and malaise (65%). Attack rates were highest among adults aged 20–39 years, consistent with exposure in occupational and social settings.

3.5. Laboratory Findings

A total of 8631 clinical samples were collected from suspected cases, with 4356 testing positive for the Mpox virus by PCR, representing a positivity rate of 50%. Typing and confirmation were performed using GeneXpert platforms and validated at the National Reference Laboratory. Most positive cases were confirmed to be the Clade II Mpox virus, consistent with regional outbreaks observed in Africa during 2022–2025.

3.6. Turnaround Time Improvements

The decentralization strategy led to substantial reductions in turnaround times for sample collection, laboratory processing, and result reporting. Before August 2024, the average duration from alert to sample collection and from sample collection to result release ranged from 24 to 72 h. Following decentralization, these durations decreased to 2–4 h, even as testing volumes increased (Table 3).

Table 3. Laboratory Timeline Indicators.

| Indicator                    | Before August 2024 | August–December 2024 | January–May 2025 | How                                             |
|------------------------------|--------------------|----------------------|------------------|-------------------------------------------------|
| Alert to sample collection   | 24–72 h            | 2–4 h                | 2–4 h            | Efficiency gains through decentralized response |
| Sample collection to the lab | 24–72 h            | 2–4 h                | 2–4 h            | Improved logistics and transport                |
| Lab to result release        | 24–72 h            | 2–4 h                | 2 h              | Stable turnaround despite increased load        |

3.7. Laboratory Network Expansion

The number of operational Mpox testing laboratories increased rapidly following decentralization, from a single National Reference Laboratory before August 2024, to 41 GeneXpert laboratories by December 2024, and 56 laboratories by May 2025. This scale-up enabled equitable diagnostic access across high-risk, newly affected, and peripheral districts (Table 4).

Table 4. Laboratory Network Expansion by Phase.

| Phase                 | Before August 2024         | August–December 2024 | January–May 2025  | How                                 |
|-----------------------|----------------------------|----------------------|-------------------|-------------------------------------|
| Labs in use           | 1 (National Reference Lab) | 41 GeneXpert Labs    | 56 GeneXpert Labs | Massive scale-up (1 → 41 → 56)      |
| Decentralization Plan | Just starting              | Ongoing              | Actively ongoing  | Demonstrated success and continuity |

3.8. Environmental Study Findings

Environmental sampling in high-density areas included surface swabs and wildlife reservoir testing. Out of 142 environmental samples, 6 (4%) were positive for Mpox viral DNA, matching sequences from human isolates. These findings suggest possible indirect transmission via contaminated surfaces rather than direct zoonotic exposure.

### 3.9. Transition and Hypotheses Generated

The descriptive and laboratory findings indicate that young adults in urban centers, particularly males, were the highest-risk groups. Transmission appears to have been primarily person-to-person, with household and community contact as key exposure pathways. Environmental detection supports potential fomite-mediated transmission. These observations generated hypotheses for further analytical studies:

1. Infection risk is associated with household contact with confirmed cases.
2. Attendance at social or occupational gatherings increases susceptibility.
3. Decentralized laboratory testing accelerates case detection and isolation, reducing secondary transmission.

### 3.10. Analytical Study Findings

Univariate and bivariate analyses confirmed higher attack rates among males, adults aged 20–39, and urban residents. Bivariate analysis identified household exposure as a significant risk factor (RR = 3.4, 95% CI 2.8–4.1,  $p < 0.001$ ). Multivariable logistic regression, adjusting for age, sex, and district, showed that household contact (adjusted OR = 3.1, 95% CI 2.5–3.8) and attendance at large social gatherings (adjusted OR = 2.2, 95% CI 1.8–2.7) were independently associated with infection. Further studies, including viral genome sequencing of selected isolates and environmental samples, are ongoing.

## 4. Discussion

This study demonstrates that decentralization of Mpox diagnostics in Burundi using a phased national strategy significantly improved outbreak detection, surveillance coverage, and turnaround time. The expansion from a single National Reference Laboratory to 56 GeneXpert-equipped laboratories increased testing capacity by 5500% and was associated with a 496% rise in weekly case detection. Diagnostic turnaround time decreased dramatically from 24–72 h to 2–4 h, enabling faster isolation of cases and strengthening outbreak control. These improvements were achieved while maintaining near-complete testing coverage and high system performance across all phases of implementation [13,14,18].

The findings contrast sharply with the Democratic Republic of the Congo (DRC), where Mpox remains endemic but laboratory confirmation has historically remained below 10% of suspected cases due to centralized diagnostics, weak transport systems, and limited laboratory infrastructure [10,11]. In 2022, fewer than 5.5% of suspected cases in the DRC were laboratory-confirmed, reflecting substantial under-detection and delayed outbreak response [10]. Similar constraints have been documented in other Central and West African countries relying on centralized reference laboratories, where delayed confirmation impairs real-time surveillance and response [8,11]. In comparison, Burundi's decentralized model demonstrates that rapid scale-up is feasible even in low-resource environments when existing molecular platforms such as GeneXpert are repurposed strategically [18].

At the continental level, Africa CDC-led assessments during the 2024–2025 Mpox emergency showed that diagnostic coverage across African Union Member States improved to approximately 53–67%, yet substantial inequities persisted between countries [13,14]. Globally, high-income countries such as the United States, Canada, and European Union states rapidly expanded decentralized testing networks, enabling same-day or next-day confirmation of cases [6,7]. For example, during the 2022 global outbreak, the United States leveraged commercial and public health laboratories to scale PCR testing nationwide, ensuring rapid case detection and contact tracing [6]. Burundi's experience aligns with global best practices, demonstrating that decentralized diagnostics are central to outbreak control but must be adapted to resource-limited settings using phased, infrastructure-efficient approaches [5,18].

#### 4.1. Strengths of the Study

This study has several strengths. First, it is based on a large national dataset covering more than 8000 suspected cases, providing robust epidemiological insight [16]. Second, it evaluates a real-world national intervention implemented during an active outbreak, enhancing external validity [1,16]. Third, it integrates epidemiological, laboratory, and operational indicators, allowing a comprehensive assessment of system performance [17]. Fourth, the use of existing GeneXpert infrastructure demonstrates cost-effective scalability [18]. Finally, the study provides one of the most detailed evaluations of Mpox diagnostic decentralization in Africa to date, offering transferable lessons for similar outbreak-prone settings [13,14].

#### 4.2. Limitations

Despite these strengths, the study has limitations. First, its descriptive design limits causal inference between decentralization and epidemiological trends. Second, data quality may vary across decentralized laboratories due to differences in reporting completeness and staff capacity [17]. Third, surveillance data may still be affected by under-reporting in remote or conflict-affected areas. Fourth, environmental sampling results should be interpreted cautiously as they do not establish transmission pathways [9]. Lastly, the longer-term sustainability and cost-effectiveness of the decentralized model were not fully evaluated and require further study [13].

#### 4.3. Clinical and Public Health Implications

The rapid reduction in diagnostic turnaround time had direct clinical implications, enabling earlier isolation of cases, timely supportive care, and reduced secondary transmission [2,4]. From a public health perspective, decentralized diagnostics strengthened surveillance sensitivity and improved outbreak situational awareness [1,3]. The integration of GeneXpert platforms into mpox diagnosis also demonstrates the feasibility of multiplexing existing diagnostic infrastructure for multiple priority diseases, improving efficiency and cost-effectiveness in resource-limited health systems. This platform-sharing approach supports broader laboratory system optimization by enabling simultaneous testing for diseases with overlapping clinical presentations and epidemiological profiles, thereby reducing misdiagnosis and improving response timeliness [18–20].

#### 4.4. Implications for Ebola and Epidemic Decentralization Models

The Burundi mpox response provides an important operational model for other high-consequence pathogens such as Ebola virus disease, Marburg virus disease, and Lassa fever. Like mpox, these diseases require rapid diagnosis, isolation, and contact tracing to prevent onward transmission and limit outbreak amplification [2,3]. The successful use of phased decentralization, mobile laboratories, and repurposed GeneXpert systems demonstrates a scalable and adaptable model for epidemic preparedness, particularly in border regions and high-mobility settings where delays in diagnosis can rapidly accelerate spread [18]. This approach aligns with International Health Regulations (2005) core capacity requirements and supports the development of integrated, multi-pathogen diagnostic networks across Africa, reinforcing system resilience while reducing reliance on highly centralized reference laboratories [17,21].

### 5. Conclusions

Burundi's phased decentralization of Mpox diagnostics represents a significant advancement in outbreak preparedness and response in a resource-limited setting. The strategy substantially improved testing coverage, reduced diagnostic delays, and enhanced

surveillance performance, contributing to more effective outbreak control. Sustaining these gains will require continued investment in laboratory systems, quality assurance, workforce capacity, and data integration. Overall, this model provides a scalable and replicable framework for strengthening diagnostic resilience across Africa and other low- and middle-income regions.

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