

Success Factors in the Response to the Mpox Epidemic in Guinea

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Abstract

Introduction: Guinea, like other West African countries, reported the emergence of MonkeyPox through its first recorded case in the forestland region. The objective of this research was to study the success factors in the response to the Mpox epidemic in Guinea. **Method:** This was a cross-sectional study with an analytical aim lasting three (03) months from May 1 to July 31, 2025, focusing on the actors involved in the response in Guinea. The data were collected using a structured questionnaire, and the analysis was carried out using Epi Info version 7 and Stata version 13 software. The search for factors linked to the success of the response was carried out through a step-by-step retrograde multivariate analysis, and the significance threshold was set at 5%. **Results:** A total of 239 participants were included, and the average age was 38 years. Male participants (52%), nurses (67%) with a secondary education level (54%) and nurses working in the Macenta health district (42%) were the most represented. Regarding factors related to the health system, 95% of participants stated that the Community was informed and sensitized about the disease and about the presence of coordination teams and a rapid response team in 79% and 84%, respectively. A lack of vaccines (98%), medicines (98%) and laboratories (94%) was reported. There are isolation sites (59%) and normative documents (55% on average) with trained staff (96%), but these reports are insufficient (32%). According to multivariate analysis, after adjusting for the order ratio, the presence of a coordination team (OR = 25.4; 95% CI: 4.23 - 251), a rapid response team (OR = 35.5; 95% CI: 3.00 - 776), care staff (OR = 37.3; 95% CI: 3.45 - 611), monitoring staff (OR = 244; 95% CI: 3.49 - 50,932),

an isolation site (OR = 8.28; 95% CI: 1.78 - 49.5), adapted equipment (OR = 18.5; 95% CI: 3.79 - 123), and care guides (OR = 86.2; 95% CI: 11.4 - 1242) were strongly associated with the success of the response to Mpox. **Conclusion:** The success of the Mpox response in Guinea relies on a functional and multisectoral organization. To ensure the sustainability of these gains, it is crucial to strengthen the coordination teams and regularly update the normative documents related to care and surveillance.

Keywords

Success Factors, Response, MonkeyPox, Guinea

1. Introduction

The emergence of a global health emergency requires rapid response and preventive measures to limit its spread at the national and international levels. The increase in the number of Monkeypox (MPox) cases in several regions of the world has led nations to adopt precautionary measures to avoid the negative impacts of this disease [1] [2]. It takes approximately 14 to 21 days for the symptoms of Mpox to disappear on their own. However, its severity is variable and can range from mild to severe, including symptoms such as fever, headache, fatigue, muscle pain, lymphadenopathy, back pain and itchy or painful rashes that characterize the disease [3]-[5]. It is possible that complications can lead to death [6]. The initial pandemic epidemic in Africa was marked by the presence of two clades with notable epidemiological and clinical differences [7]. There is a need for short-term emergency training to enable frontline health professionals to effectively diagnose and manage emerging cases while adopting adequate protective measures to reduce the risk of infection and virus transmission [8]. Prevention of human-to-human transmission relies on early detection, case isolation, contact tracing and vaccine introduction to manage the current global epidemic [9]. A comprehensive approach including vaccination, an adequate supply of equipment, enhanced surveillance, rigorous disease control and cross-border cooperation at the international level is also essential. Public education also plays a key role by emphasizing the reduction of exposure risks through limiting sexual partners, avoiding contact with travelers from affected areas or with potential carrier animals and restricting travel to endemic areas [10] [11]. In the United States, 2891 cases were reported between May and July 2022, 94% of which were associated with sexual intercourse with frequent genital and anal lesions but not lethality [2]. In Montreal, in October 2022, 402 cases of Mpox were reported, mainly involving sexual transmission; the median age was 37 years, and no deaths occurred due to rapid genomic surveillance and a targeted community response focused on rapid vaccination of at-risk individuals [12]. In the UK, predominant sexual transmission and the presence of viral DNA in semen were reported for several patients in 2022 [13]. In Africa, MPOX is endemic in several countries, such as Nigeria, between 2017 and 2018;

122 patients were confirmed to have a 39% hospitalization rate and a case fatality rate of 6%. The distribution of cases and contacts suggested primary zoonotic transmission and secondary human-to-human transmission [14]. Mpox cases after the cessation of smallpox vaccination campaigns were reported in 2010, with a lethality greater than 9% [15].

In Guinea, the Ebola resurgence in 2021 was quickly brought under control thanks to urgent in-depth mobilization and multisectoral coordination, despite the difficult context. Actions focused on the key pillars of the response made it possible to limit the spread and save lives [16]. However, the first case of Mpox infection was reported in the forest region beginning in September 2024, but data on response strategies to this epidemic are limited; hence, the interest in this topic was limited. The objective of this research was to study the success factors in the response to the Mpox epidemic in Guinea.

2. Study Methods

2.1. Study Framework

The Republic of Guinea is a coastal country located in the western part of the African continent, halfway between the Equator and the Tropic of Cancer (7°30' and 12°30' North latitude and 8° and 15° West longitude). Covering an area of 245,857 km², it bordered west by Guinea-Bissau and the Atlantic Ocean, north by Senegal and Mali, east by Côte d'Ivoire, and south by Sierra Leone and Liberia [17]. The country has a population of approximately eleven million people, 52% of whom are women and 16% of whom are children under the age of five [18].

From a geoecological perspective, Guinea is divided into four distinct natural regions that are internally homogeneous: Guinea Maritime, Middle Guinea, Upper Guinea, and Forest Guinea [17] [19]. The country owes this uniqueness to its natural environment, characterized by climatic contrasts, mountain barriers, and the orientation of the reliefs, which combine to give each region its own specificities in terms of climate, soil, vegetation, and the way of life of the populations. Administratively, Guinea is subdivided into seven administrative regions (Boké, Faranah, Kindia, Labé, Mamou, Kankan, and N'Zérékoré), with the city of Conakry, the capital, enjoying special status as a special zone. Each administrative region consists of prefectures, with the number of prefectures varying. In total, there are 33 prefectures, 38 urban communities (CUs), five of which are in Conakry, and 303 rural development communities (CRDs) [17] [19]. It is one of the countries in West Africa most severely affected by the Ebola virus disease epidemic [18].

The infant and maternal mortality rates are estimated at 123% and 724 per 100,000 live births, respectively. The country faces a serious shortage of human health resources, with only 98 health workers per 100,000 inhabitants. These human resources are unevenly distributed across the country, with nearly 52% of health workers residing in Conakry and its surroundings, serving only 15% of the population [18].

2.2. Study Site

The study site will encompass all three national directorates (National Agency for Health Security, National Directorate of Epidemiology and Disease Control, National Directorate of Public and Private Hospital Establishments), as well as the thirty-eight (38) health districts of Guinea. Eight (08) regional health inspections, thirty-eight (38) prefectural health directorates, and thirty-eight (38) epidemic treatment centers play crucial roles in the epidemic response in the Republic of Guinea. This response is coordinated at the central level, represented by the Ministry of Health, the National Agency for Health Security, and the National Directorate of Epidemiology and Disease Control.

2.3. Type and Duration of the Study

This was a cross-sectional study with analytical aims lasting three (03) months from May 1 to July 31, 2025.

2.4. Study Population

It consists of all the actors involved in the epidemic response in Guinea, including those from the technical departments of the Ministry of Health, the regional health inspections, the prefectural health directorates, and the epidemic treatment centers.

2.5. Sampling

The sampling method used for this study was no probabilistic and was based on the convenience sampling technique. It involved selecting actors from the epidemic response by health districts in Guinea to answer our survey questions. We also used purposive sampling to select the heads of departments from the Ministry of Health, regional health inspections, prefectural health directorates, and epidemic treatment centers. The sample size was 239 participants.

2.6. Study Variables

- Dependent variable: This variable was “success of the response”. It was a dichotomous variable (yes/no). The presence of all success factors was checked by yes or one (1), and their absence was checked by no or zero (0).
- Independent variables: Care guide, existence of surveillance guide, existence of risk communication guide, existence of response fund, existence of care staff, existence of surveillance staff, existence of isolation site, existence of medication, existence of equipment, existence of rolling logistics, existence of analysis laboratory, virus serotyping, circulating glade, time taken before hospitalization, clinical characteristics, age, personal hygiene, presence of comorbidity, vaccination status, information/community awareness, correct application of care guide, correct application of surveillance guide, correct application of risk communication guide, rendering of results, existence of coordination team, and existence of rapid intervention team.

2.7. Data Collection Techniques and Tools

Data were collected through observation, document analysis, and a survey questionnaire, using an observation grid, a coding sheet, and a questionnaire, respectively. Some health workers from the National Health Security Agency were recruited to assist in data collection from the target groups. The data collection tools were pre-tested in the meeting room of the National Health Security Agency.

2.8. Statistical Analysis Tools

The data collected were verified and validated as the investigators progressed in the field. They were entered using a data entry form developed with KoboToolbox. The data analysis was performed using Epi-Info version 7 and Stata version 13.

The descriptive part of the analysis aimed to describe the study sample through a detailed description of the variables. Qualitative variables were described in terms of absolute and relative frequency, while quantitative variables were described by the mean $\pm$ standard deviation if the distribution was normal, and by the median and quartiles (Q1, Q3) if the distribution was not normal.

The search for factors associated with the success of the response to the MPOX epidemic in Guinea was carried out in two stages:

- First, a univariate analysis was performed by cross-referencing the dependent variable with the independent variables.
- Then, a multivariate analysis was performed using stepwise backward multiple logistic regression. In this step, all statistically significant variables at the 20% threshold in the univariate analysis were included in the initial model. Variables with a p-value lower than 20% were retained. A multivariate analysis then gradually eliminated variables with the highest p-values using a stepwise backward approach until the final model was obtained. Variables associated with a 5% threshold were retained in the final model.

To assess the adequacy of the final model, the Hosmer-Lemeshow goodness-of-fit test was performed, with a p-value greater than 5%.

3. Results

3.1. Sociodemographic Characteristics

Sur les 239 individus étudiés, la majorité provient de Macenta (42%), suivie de Mamou (16%) et Yomou (8.8%). D'autres districts comme Dubreka et Mandiana représentent chacun 4.6%, tandis que Forecariah (0.8%) et Gueckedou (0.4%) ont moins de cas. L'âge moyen est de 38 ans (plage de 31 à 42 ans). En termes de sexe, 52% des participants sont hommes et 48% sont femmes. Concernant l'état civil, 82% sont mariés, 12% célibataires, 4.2% veufs et 1.7% divorcés. Niveau d'études : 54% ont un niveau secondaire, 42% un niveau universitaire, et 3.3% un niveau primaire. Pour les professions, la majorité sont des infirmiers (67%), suivis par des médecins (19%) et des techniciens de laboratoire (11%). Le reste des participants exerce des métiers comme hygiénistes, pharmaciens, ou maternité (**Table 1**).

Table 1. Sociodemographic characteristics of the 239 participants.

Variables	N = 239 ¹
Health district	
Dabola	1 (0.4%)
Dubreka	11 (4.6%)
Faranah	18 (7.5%)
Forecariah	2 (0.8%)
Gueckedou	1 (0.4%)
Kindia	17 (7.1%)
Kissidougou	12 (5.0%)
Lola	1 (0.4%)
Macenta	100 (42%)
Mamou	39 (16%)
Mandiana	11 (4.6%)
Pita	1 (0.4%)
Ratoma	4 (1.7%)
Yomou	21 (8.8%)
Average age (in years)	38 (31, 42)
Sex	
Female	114 (48%)
Male	125 (52%)
Marital status	
Bachelor	28 (12%)
Divorcee	4 (1.7%)
Married	197 (82%)
Widower	10 (4.2%)
Level of study	
Primary	8 (3.3%)
Secondary	130 (54%)
University	101 (42%)
Occupation	
Others*	6 (2.5%)
Hygienist	3 (1.3%)
Nurses	159 (67%)
Laboratory technician	26 (11%)
Doctor	45 (19%)

¹n (%); * Pharmacy (4); midwifery (1) and sociology of health (1).

3.2. Description of Resources and Response Capacities

Among the 239 participants, 75% reported at least one suspected case of Mpox in their locality, while 46% confirmed positive cases. Clade II was more prevalent, accounting for 75% of the positive cases, compared to 25% for Clade I. The average age of the patients was 18 years, with a range from 15 to 28 years. Vaccination coverage was low, with only 5.4% of patients having received the Mpox vaccine. In terms of comorbidities, 6.3% of participants reported having additional health issues, with HIV being the most common comorbidity (60%). The majority of patients (67%) were hospitalized within 7 days of symptom onset, while 33% were hospitalized after more than 7 days. Regarding clinical classification, 90% of the cases were classified as simple, while 10% were categorized as severe (**Table 2**).

Table 2. Description of resources and response capacities (N = 239).

Variables	N = 239 ¹
At least one suspected case of Mpox in the locality	
No	59 (25%)
Yes	180 (75%)
Existence of positive cases	
No	97 (54%)
Yes	83 (46%)
Clade of positive cases	
Clade I	21 (25%)
Clade II	62 (75%)
Average age of cases (suspected, probable and confirmed) of Mpox (in years)	18 (15, 28)
Patients vaccinated against Mpox	
No	226 (95%)
Yes	13 (5.4%)
Presence of comorbidities	
No	224 (94%)
Yes	15 (6.3%)
Comorbidities presented	
Others	4 (27%)
Diabetes	1 (6.7%)
Sickle cell disease	1 (6.7%)
HIV	9 (60%)
Time taken before patients were hospitalized	
<7 days	160 (67%)
>7 days	79 (33%)

Continued

Clinical classification of cases	
Graves	24 (10%)
Simple	215 (90%)

¹n (%); Median (Q1, Q3).

3.3. Patient-Related Characteristics

The majority of respondents (95%) confirm that the community has been informed about the Mpox epidemic. A coordination team is in place for the epidemic response (79%), and an active response has been implemented (84%). Most healthcare staff (87%) are trained in Mpox management, but 32% feel there is insufficient personnel. Regarding surveillance, 93% report the presence of dedicated personnel, and 88% mention rapid communication between teams. However, 98% of respondents indicate the absence of dedicated funds for the response, and 98% report a lack of medications and vaccines. In terms of equipment, 63% confirm its availability, while logistics (e.g., ambulances, motorcycles) is insufficient (52%). No analysis laboratory for Mpox exists, and among those who have one, 71% perform virus serotyping. Finally, 55% of respondents confirm the existence of management, surveillance, and risk communication guides, but the correct application of these guides varies between 68% and 79%. Key gaps include funding, logistics, medications, and vaccines (see **Table 3**).

Table 3. Patient-related characteristics.

Variables	N = 239 ¹
Community informed/made aware of Mpox	
No	13 (5.4%)
Yes	226 (95%)
Mpox epidemic response coordination team	
No	51 (21%)
Yes	188 (79%)
Mpox epidemic response	
No	39 (16%)
Yes	200 (84%)
Existence of care staff in the response to the Mpox epidemic	
No	30 (13%)
Yes	209 (87%)
If yes, this staff has been trained in the management of Mpox	
No	9 (4.3%)
Yes	200 (96%)
If yes, the number of this staff is sufficient to support Mpox	

Continued

No	67 (32%)
Yes	142 (68%)
Existence of surveillance personnel in the response to the Mpox epidemic	
No	17 (7.1%)
Yes	222 (93%)
Existence of a means of rapid communication between the different bodies involved in the response to the Mpox epidemic	
No	29 (12%)
Yes	210 (88%)
Existence of a fund for the response to the Mpox epidemic	
No	235 (98%)
Yes	4 (1.7%)
Existence of an isolation site for the management of Mpox cases (suspected, probable and confirmed)	
No	99 (41%)
Yes	140 (59%)
Existence of drugs for the response to the Mpox epidemic	
No	234 (98%)
Yes	5 (2.1%)
Existence of vaccines for the response to the Mpox epidemic	
No	235 (98%)
Yes	4 (1.7%)
Availability of equipment for responding to the Mpox epidemic	
No	89 (37%)
Yes	150 (63%)
Existence of rolling logistics (Ambulance, Motorcycle, etc.) for the response to the Mpox epidemic	
No	124 (52%)
Yes	114 (48%)
Do not know	1
Existence of an analysis laboratory for the response to the Mpox epidemic	
No	225 (94%)
Yes	14 (5.9%)
If yes, perform serotyping of the Mpox virus	
No	4 (29%)
Yes	10 (71%)
If yes, timeframe for reporting results	
Less than or equal to 48 hours	9 (64%)

Continued

More than 48 hours	5 (36%)
Existence of a Management Guide for the response to the Mpox epidemic	
No	107 (45%)
Yes	132 (55%)
Correct application of the Management Guide for the response to the Mpox epidemic	
No	31 (23%)
Yes	101 (77%)
Existence of a Surveillance Guide for the response to the Mpox epidemic	
No	107 (45%)
Yes	132 (55%)
Correct application of the Surveillance Guide for the response to the Mpox epidemic	
No	28 (21%)
Yes	104 (79%)
Existence of a Risk Communication Guide for the response to the Mpox epidemic	
No	90 (38%)
Yes	149 (62%)
Correct application of the Risk Communication Guide for the response to the Mpox epidemic	
No	48 (32%)
Yes	101 (68%)

¹n (%); Median (Q1, Q3).

3.4. Success Factors

According to multivariate analysis, after adjusting for the order ratio, the presence of a coordination team (OR = 25.4; 95% CI: 4.23 - 251), a rapid response team (OR = 35.5; 95% CI: 3.00 - 776), care staff (OR = 37.3; 95% CI: 3.45 - 611), monitoring staff (OR = 244; 95% CI: 3.49 - 50,932), an isolation site (OR = 8.28; 95% CI: 1.78 - 49.5), adapted equipment (OR = 18.5; 95% CI: 3.79 - 123), and care guides (OR = 86.2; 95% CI: 11.4 - 1242) were strongly associated with the success of the response to Mpox (see **Table 4**).

Table 4. The main success factors in the response to the Mpox epidemic in Guinea.

Variables	GOLD	95% CI	p-value
Mpox epidemic response coordination team			<0.001
No	—	—	
Yes	25.4	4.23, 251	
Existence of a rapid response team for the Mpox epidemic			0.003
No	—	—	

Continued

Yes	35.5	3.00, 776	
Existence of care staff in the response to the Mpox epidemic			0.003
No	—	—	
Yes	37.3	3.45, 611	
Existence of surveillance personnel in the response to the Mpox epidemic			0.009
No	—	—	
Yes	244	3.49, 50,932	
Existence of an isolation site for the management of Mpox cases (suspected, probable and confirmed)			0.006
No	—	—	
Yes	8.28	1.78, 49.5	
Availability of equipment for responding to the Mpox epidemic			<0.001
No	—	—	
Yes	18.5	3.79, 123	
Existence of a Management Guide for the response to the Mpox epidemic			<0.001
No	—	—	
Yes	86.2	11.4, 1242	
Existence of a Surveillance Guide for the response to the Mpox epidemic			
No	—	—	
Yes	19.4	2.92, 193	

CI = Confidence Interval to 95%, OR = Odds Ratio.

4. Discussion

The success of the response to the Mpox epidemic depends on the capacity of local health systems to rapidly coordinate interventions and mobilize resources. We conducted this cross-sectional study with the aim of identifying the factors influencing the success of this epidemic in Guinea. Several studies highlight that the effectiveness of health responses depends on the availability of structured coordination teams, rapid interventions and human resources trained in surveillance and case management [20] [21].

In our series, the profile of response actors was dominated by young participants with a secondary education and nurses. Health personnel, particularly nurses, occupy an essential place in the prevention and control of epidemics within hospitals and clinics worldwide [10]. Our results highlight the need for targeted strengthening of the surveillance and care skills of response personnel.

Almost all of our respondents believed that the population was informed about the existence of the disease, thus reflecting an effective communication strategy. According to the literature, early detection and management of epidemics can be optimized through community surveillance by mobilizing community members to ensure local health monitoring [22]. A European series argued that emergency management is based on an essential pillar that is composed of risk communication, community engagement and infodemic management [23]. Community mobilization can be achieved through this approach, which is essential for the effective management of an epidemic through the early detection of cases, the acceptance of public health measures and the reduction of stigma.

Clinically, the affected subjects were young, and clade II was predominantly reported. HIV was the most common coinfection. According to data from 16 countries between April and June 2022, 41% of patients were infected with HIV, with a median age of 38 years [24]. The circulation of clade II viruses in the West African region is supported by the literature, as clade II viruses are responsible for epidemic outbreaks in this region [25].

In this study, multivariate analysis revealed that the presence of a coordination team, rapid intervention, surveillance and management are significantly associated with the success of the response. Our result is supported by data from a systematic review calling for strengthened international support for surveillance so that the detection of Mpox cases is fundamental to monitoring the evolution of the dynamics of the epidemiology of this re-emerging disease [26]. This demonstrates that the performance factors of a response depend on the capacity of the country's health system to organize and quickly deploy human and material resources.

In addition to the strengths reported above, our study highlighted major deficiencies in the response sector focused on the lack of vaccines against Mpox and drugs for management as well as the absence of adequate laboratories for the analysis of samples in the majority of prefectures. However, the literature recommends that public health strategies integrate the strengthening of health infrastructures to improve surveillance systems to guarantee equitable access to vaccines and treatments [27]. These identified deficiencies can compromise the capacity to effectively diagnose, treat and prevent new cases.

The existence of an isolation site, suitable equipment and, above all, standardized management guides were also associated with the effectiveness of the response. Our result is supported by the fact that isolating patients upon detection at appropriate sites significantly reduces transmission [28]. Hence, there is interest in having a clear and available regulatory framework with adequate infrastructure to contain the disease.

Our study also reported that the majority of staff members reported having been trained but that the number was insufficient. This finding is in contrast to that of a Turkish series reporting that up to 95.8% of nurses had not received any specific training on the MPOX [29]. This justifies the crucial need to strengthen

these human resources to balance the tension between the technical capacities of staff and their volume.

One limitation of this study is that it is cross-sectional and based on declarative data susceptible to memory bias and social desirability, despite which it provides a relevant and contextual basis for strengthening Mpox response strategies in resource-limited settings.

5. Conclusion

This study highlights the importance of a responsive healthcare system based on effective coordination, qualified human resources, and adequate logistical means. Key success factors include the presence of a coordination team, a rapid response team, staff for care and surveillance, as well as isolation sites, appropriate equipment, and guidelines for the management and surveillance of the Mpox response. To ensure the sustainability of these gains, it is crucial to strengthen coordination teams and regularly update the normative documents related to care and surveillance.

Ethical Approval and Consent to Participate

- The study received approval from the National Ethics Committee for Health Research;
- Data collection authorization was granted by the General Directorate of the National Health Security Agency;
- An information note was provided to participants, and their consent was obtained before administering the questionnaire. Anonymity and confidentiality were ensured throughout the data collection and analysis process.

Availability of Data and Materials

The data generated and/or analyzed during this study are available from the corresponding author upon reasonable request.

Authors' Contributions

- KPAMY Dimai Ouo, Mohamed Lamine KOUROUMA and Gbawa CAMARA: Writing the protocol, data collection, manuscript writing, and table presentation;
- CONDE Sory, CHERIF Fatoumata, DELAMOU Alexandre, TRAORE Fodé Amara, DOUMBIA Seydou, Fatoumata KEITA, Mamadou Dian SOW, PETER John Winch, SIDIBE Sidikiba, Bassirou DIARA: Review and revision of the protocol and manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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