

Preparation and Response to Public Health Emergencies in Senegal between 2023-2025: Experience of the Health Emergency Operations Center

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Abstract

Introduction: African countries regularly face public health emergencies, including epidemics and natural disasters. The implementation of emergency management programs through Public Health Emergency Operations Centers (PHEOCs) is an essential mechanism for effectively addressing these threats.

Method: The Health Emergency Operations Center (HEOC) of Senegal coordinates preparedness and response to public health emergencies. It is attached to the Directorate General of Public Health. The HEOC is managed by a director. The HEOC is activated by the Minister of Health upon the proposal of the Director and after consultation with the Director General of Public Health. This retrospective descriptive study, covering the period from January 2023 to December 2025, analyzes the activities of the HEOC based on activity reports and situation reports (Sitrep) from the Incident Management System (IMS). The analysis of performance indicators for Public Health Emergency Operations Centers (PHEOCs) has identified key strengths and weaknesses. **Results:** Between 2023 and 2025, the HEOC of Senegal carried out several emergency management activities, including risk assessments using the World Health Organization's STAR tool, preparedness activities such as developing planning documents, training rapid response teams, simulation exercises, and pre-positioning equipment in the regions. Regarding the response, the implementation of the incident management system enabled a coordinated and integrated response to outbreaks of Crimean-Congo Hemorrhagic Fever (CCHF), Mpox, Rift Valley Fever (RVF), and dengue fever. **Conclusion:** These experiences illustrate the capabilities of the HEOC in preparing for and responding to health emergencies and underscore the importance of continuously strengthening

the structure and promoting multisectoral training and an integrated approach to the prevention and control of health emergencies.

Keywords

Public Health, Emergency Preparedness Response

1. Introduction

Public health emergencies are recurrent in Africa and pose a persistent threat to health security at the national, regional, and global levels. West African countries, including Senegal, have faced several major health crises over the past decade, including Ebola virus disease, the COVID-19 pandemic, mpox, and Lassa fever [1] [2]. These events have highlighted the structural challenges facing health systems, particularly in early detection, coordination of responses, and rapid resource mobilization.

In Senegal, the 2014 Ebola virus disease outbreak, although limited to a single imported case, constituted a major test for the health system [3]. It revealed some strengths, such as the capacity for rapid detection and containment, but also weaknesses, particularly in terms of multisectoral coordination, centralized information management, and operational preparedness. Most African countries, including Senegal, lacked formal institutional structures fully dedicated to managing public health emergencies. Interventions were often fragmented, involving a multitude of actors operating in a poorly coordinated manner, with sectoral action plans developed without an integrated governance mechanism [4]. This organization limited the effectiveness of responses and led to delays in decision-making.

This experience highlighted the need for a dedicated institutional mechanism capable of ensuring effective coordination among actors and structured management of health emergencies.

In accordance with the recommendations of the World Health Organization, Public Health Emergency Operations Centres have been established in several African countries to ensure efficient coordination of actors, centralize information, and guarantee integrated, structured, and rapid management of health emergencies, from preparation to response and recovery [5].

In 2014, Senegalese health authorities, in line with international recommendations, strengthened the country's emergency management architecture by establishing the Health Emergency Operations Center (HEOC). The HEOC thus became a pillar of the national preparedness and response system. It centralizes information, coordinates the interventions of various stakeholders, optimizes resource use, and ensures rapid and informed decision-making.

The management of COVID-19 in Senegal has demonstrated significant progress, particularly in national coordination, risk communication, and resource mobilization. However, it has also highlighted persistent challenges, such as the

overload of surveillance systems, large-scale logistical management, and the need for more proactive planning [6] [7].

The establishment of the Public Health Emergency Operations Center represents a major evolution in the architecture of health emergency management. However, the experiences and lessons learned from their operation remain poorly documented in several African contexts, particularly in Senegal. This lack of documentation limits the production of evidence-based data needed to identify, analyze, and share best practices that can sustainably strengthen health security and improve public health emergency preparedness and response mechanisms.

The objective of this work is to describe the health emergency preparedness and response activities carried out by the HEOC of Senegal during the study period.

2. Methodology

2.1. Study Framework

Senegal's Public Health Emergency Operations Center (HEOC) serves as a strategic platform for coordinating information, resources, and responses in the management of public health emergencies. Operating under the authority of the Directorate General of Public Health within the Ministry of Health and Social Action, it plays a central role in preparedness, response, and recovery efforts during public health emergencies.

The HEOC is headed by a director appointed by ministerial order, assisted by a deputy director. Its organization is based on three functional units: the Operations Unit, the Planning Unit, and the Administration and Finance Unit, each headed by a unit director. In an emergency, the decision to activate the HEOC is made by the Minister of Health, upon the recommendation of the Director of the HEOC and after consultation with the Director General of Health.

2.2. Study Type and Period

This is a retrospective descriptive study covering the period from January 2023 to December 2025. It examines all public health emergency preparedness and response activities carried out by the HEOC.

2.3. Data Sources

The data used come primarily from:

- HEOC annual activity reports.
- Status reports generated through the Incident Management System (IMS) during activations.
- Minutes of coordination meetings and operational dashboards.

2.4. Data Collection Tools

A standardized data collection form was developed to ensure the consistent extraction of relevant information from various sources.

2.5. Indicators Examined

To evaluate the HEOC, several preparedness and response indicators were identified, including:

Preparedness Indicators

- Number of plans and procedures developed
- Number of simulation exercises conducted
- Number of equipment deployments
- Number of people trained in emergency management
- Number of rapid response teams available

Response Indicators

- Number of activations
- Number of incidents managed simultaneously
- Number of incident action plans
- Number of rapid response team deployments

2.6. Data Analysis

The data were subjected to descriptive and comparative analyses across the various years of the study period. The analysis highlighted the gaps.

3. Results

3.1. Preparation

3.1.1. Risk Assessment

The national risk assessment, conducted using a “One Health” approach and involving human health, animal health, environmental, transportation, and other key sectors, is based on an analysis of historical statistical data and an assessment of exposures, vulnerabilities, and existing capacities. This integrated approach has made it possible to classify risks into very high, high, moderate, low, and very low levels (see **Figure 1**). To assess risks, the STAR tool uses probability, severity, capabilities, and vulnerability.

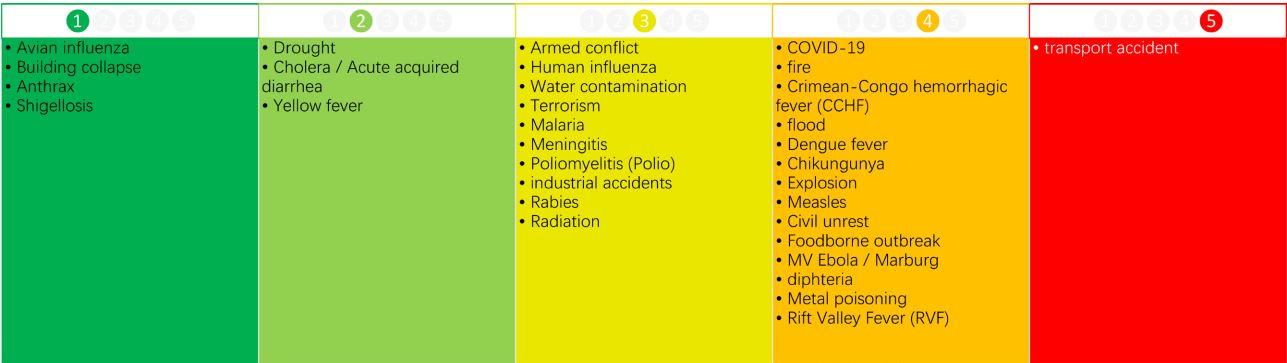
The HEOC has also organized risk assessments in 4 of the 14 regions.

3.1.2. Updating Resource Mapping

HEOC has a resource mapping platform, GeoCOUS, which was updated in 2024 to provide comprehensive mapping of healthcare facilities, human resources, and logistical resources across the entire country.

3.1.3. Planning

The data analysis highlights a gradual strengthening of HEOC’s planning capabilities through the development of five (05) key strategic and operational tools between 2023 and 2025: the 2023-2026 Strategic Plan and the Albert Royer Hospital’s Contingency Plan in 2023; the RVF and CCHF contingency plans in 2024; and the multi-risk plan in 2025. The period was also marked by the revision of HEOC’s operational manuals and internal procedures in 2025, as well as the development of a project to respond to traffic accidents in remote areas.



Source: Risk assessment report, Senegal 2023.

Figure 1. Results of strategic risk assessment using the WHO STAR tool at the national level.

3.1.4. Human Resources

During the study period, we noted four (4) staff departures, including a director and a deputy director, and five newly assigned staff members, including the current director and the head of the operations unit.

The HEOC faces difficulties in diversifying the profiles of its permanent staff according to the “One Health” approach, a situation that may be linked to its institutional anchoring within the Ministry of Health.

Regarding non-permanent staff, HEOC was able to set up two types of multi-sectoral rapid response teams with the support of its partners, in particular the SURGE team, composed of 60 experts selected through a call for applications, and the mobile response and support team, composed of an average of 80 experts per region, selected at the regional level by the regional governor. During the study period, eight of the 14 regions had mobile response and support teams.

3.1.5. Training

Between 2023 and 2024, the HEOC implemented a training program on the Incident Management System (IMS). This program trained 221 agents from the human, animal, and environmental health sectors in 7 of the 14 regions.

In addition, the training related to the Public Health Emergency Operations Centres (PHEM) programme, initiated in August 2025, has enabled the strengthening of 60 human health workers, covering 9 of the 14 subnations of the country. With these training programs, the IMS is established at the subnational level to manage epidemics and disasters.

Additional training modules were also provided to the rapid response teams. In addition to in-person sessions, four online training courses were organized on priority topics, including Mpox, dengue fever, rabies, and the psychosocial care of victims in emergency situations.

We consistently observe gaps in emergency management training according to the One Health approach in all regions and countries.

3.1.6. Simulation Exercise

During the period under review, the HEOC conducted several simulation exer-

cises aimed at strengthening the preparedness and coordination of stakeholders in the face of health emergencies.

In 2023, one (1) tabletop simulation exercise was organized with national stakeholders.

In 2024, six (6) tabletop simulation exercises were conducted, including one (1) cross-border exercise. This year was also marked by the conduct of functional exercises focusing on managing a mass influx of injured people into healthcare facilities.

In 2025, two (2) simulation exercises were conducted, including one (1) tabletop exercise and one (1) cross-border exercise. This cross-border exercise, conducted with the six (6) neighboring countries, enabled the establishment of an information exchange platform, facilitating coordination and real-time data sharing between the states.

Furthermore, no large-scale exercises were conducted during this period, although a large-scale simulation exercise is planned for 2026.

3.1.7. Equipment

Part of the preparation process involves pre-positioning personal protective equipment kits in all regions. Regions with land entry points have been provided with IT equipment for use at the entry points. The HHEOC has a fleet of about ten vehicles used in preparation and in response.

3.2. Response

3.2.1. Deployment of Response Teams

The SURGE and EMIS rapid response teams were deployed eight times during the study period, with seven deployments supporting the outbreak response through investigations, active case finding, care, risk communication, community engagement, and infection prevention and control (IPC).

These teams were also deployed during the flood response in the northern regions of the country.

3.2.2. Activation of the HEOC

Between 2023 and 2025, the Health Emergency Operations Center (HEOC) was activated four times to respond to various public health emergencies in Senegal. The first activation, in April 2023, was in response to the Crimean-Congo haemorrhagic fever epidemic. The second, in August 2024, aimed to strengthen national preparedness following the declaration of Mpox as a public health emergency. In August 2025, the HEOC was activated to respond to the Mpox epidemic, followed in September 2025 by a fourth activation for Rift Valley fever.

3.2.3. Incident Management System (IMS)

At each activation, the Incident Management System (IMS) is implemented to coordinate all response activities, mobilizing multisectoral and multidisciplinary teams appropriate to the nature of the incident (**Figure 2**).

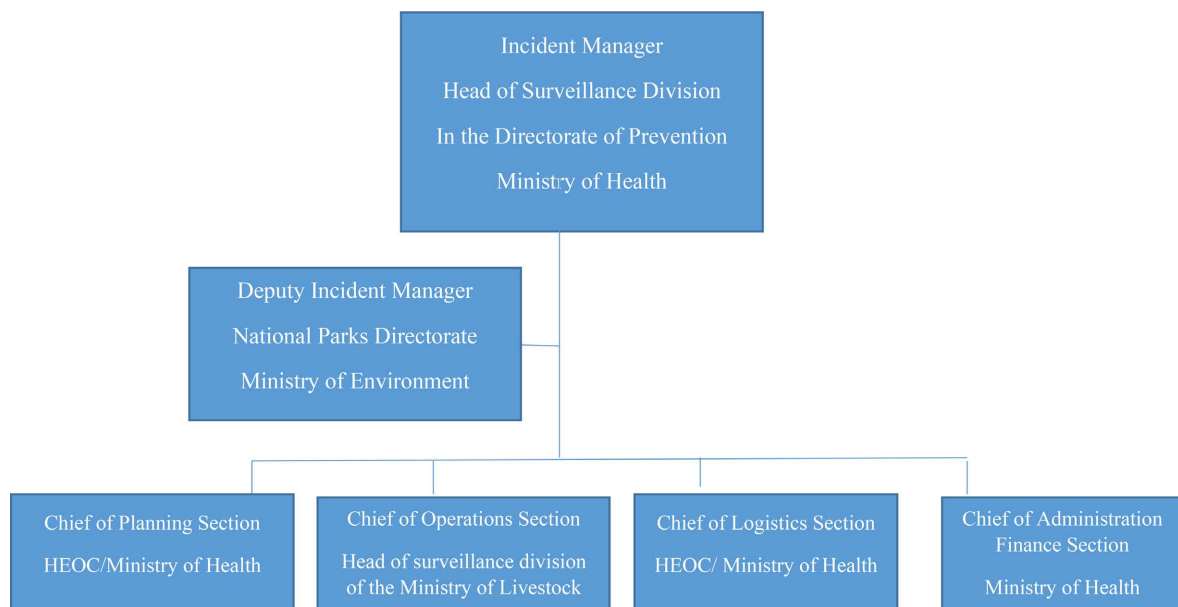
This IMS emergency management model is also used in all regions of the country.

When the HEOC is active, the Incident Management System (IMS) coordinates

activities on a multisectoral basis, including:

- The collection, analysis, and dissemination of epidemiological data through situation reports (SITREP).
- The mobilization and allocation of human, financial, and material resources.
- Communication on risks and community engagement.
- Infection Prevention and Control (IPC).
- Case management.
- Logistical support.
- Deployment of rapid response teams.
- Monitoring and evaluation of the measures implemented.

Between September and December 2025, the HEOC hosted two IMS simultaneously, due to the dual activation linked to the Mpox and Rift Valley Fever (RVF) epidemics. At the same time, in response to the increase in dengue cases, the response initially coordinated by the RVF dedicated team was expanded to also include the management of this dengue epidemic.



Source: Incident Action Plans 1 RVF Senegal 2025.

Figure 2. Incident management system flowchart for the RVF epidemic.

3.2.4. IMS for the Crimean-Congo Haemorrhagic Fever Response

The Incident Management System (IMS) set up during the Crimean-Congo haemorrhagic fever (CCHF) epidemic in 2023 enabled the development of four Incident Action Plans (IAPs). A total of 23 cases, including 5 deaths, were recorded up to December 31, 2025. An intra-action review of the response to this epidemic was carried out in 2024. However, the absence of a formal incident deactivation note and the low activity of the IMS since 2024 were noted.

3.2.5. IMS Preparedness for the Mpox Response

In August 2024, the HEOC was activated to support national preparedness for the

risk of a Mpox epidemic. This activation led to the development of three Incident Action Plans (IAPs) and a contingency plan specific to Mpox. Several preparedness activities were implemented during the activation period. The HEOC was deactivated in February 2025, with no cases of Mpox reported.

3.2.6. IMS for the Mpox Response

The first confirmed case of Mpox was reported in Senegal on August 22, 2025, leading to the activation of the HEOC to coordinate the response. A total of nine cases of Mpox were recorded, with no deaths. The Incident Management System (IMS) put in place enabled the development of two Incident Action Plans (IAPs). However, the response was marked by limited mobilization of resources, which were primarily directed toward the response to the Rift Valley fever epidemic, considered more severe in terms of lethality. For this incident, the HEOC was deactivated in December 2025.

3.2.7. IMS for the Rift Valley Fever and Dengue Response

The Rift Valley fever (RVF) epidemic was declared in Senegal in September 2025, leading to the activation of the HEOC to support the coordination of the response in the affected regions. Between September and the end of December 2025, 558 confirmed cases of RVF were reported, including 31 deaths, corresponding to a case fatality rate of 5.5%. Faced with the concomitant increase in dengue cases, the response initially dedicated to RVF was expanded to include dengue control activities. Regarding the dengue epidemic at the end of 2025, we recorded 6668 cases with 3 deaths. In December 2025, the RVF IMS developed a third Incident Action Plan (IAP) and initiated a de-escalation phase, in line with the decrease in the number of cases.

4. Discussion

Between 2023 and 2025, the Health Emergency Operations Centre (HEOC) strengthened preparedness and response to health emergencies through risk assessments, training, simulation exercises, and the deployment of rapid response teams. The HEOC was activated once for preparedness and three times for response to outbreaks of CCHF, Mpox, RVF, and dengue. Interventions included coordination through the Integrated Management System (IMS), surveillance, infection prevention and control (IPC), vector control, risk communication, and logistical support.

Following the joint external assessment of Senegal's capacity in relation to the IHR, the HEOC initiated a new preparedness process. Risk assessment using the WHO's STAR tool was one of the first activities in this process. Risk assessment using the WHO STAR tool helps personnel responsible for managing risks related to health emergencies and disasters to identify and assess risks as part of strategic planning to improve preparedness [8].

Updating the mapping of human and material resources using the GeoCOUS information management software is a key element of health emergency prepar-

edness in our context. Previous work, particularly the work of Chan *et al.* [9], has shown that the absence of hospital information systems negatively affects the performance and sustainability of the supply chain.

Furthermore, the experience of the COVID-19 pandemic has highlighted the importance of having information systems in place beforehand, as organizations with such tools have demonstrated greater preparedness and resilience in the face of disruption [10].

In terms of human resources, HEOC has been marked by high staff turnover, characterized by frequent departures and the regular arrival of new employees. This recurring phenomenon has had an adverse impact on the management of health emergencies, due to the loss of trained and experienced staff, coupled with the integration of new employees requiring training and capacity building. That is why the Independent Oversight Advisory Committee of the World Health Organization's Health Emergencies Management Program has recommended improving staff retention and skills management [11]. By following this recommendation from the World Health Organization, Senegal could strengthen its efforts to retain healthcare workers in general, and managers involved in emergency response in particular, notably by implementing structured and attractive career plans.

Training sessions and simulation exercises were organized during the preparation phase. Simulations provide an opportunity to learn from mistakes through feedback. This can be defined as an approach that aims to improve practice in all its aspects and at all levels (strategic, tactical, operational) by determining and implementing measures based on objective analysis of the facts and guidance from the chain of command [12]. Several studies have demonstrated the importance of simulation exercises as an appropriate tool for testing preparedness and response solutions [13] [14].

The activation of the HEOC has become common practice in Senegal, with four activations recorded between 2023 and 2025, compared to just three between 2014 and 2023, reflecting an increase in and better organization of the use of the incident management system (IMS). The IMS was set up to respond to various epidemics and has carried out several activities to control these incidents at an early stage. The response activities carried out through the activation of the Health Emergency Operations Center via the incident management system (IMS) during the CCHF, Mpox, RVF, and dengue epidemics clearly demonstrated the need to make greater use of this standardized mechanism for effective control and response to other epidemics. This system is based on effective coordination, collaboration, and communication models between different services and organizations, with a clearly defined chain of command and control [15].

Publications from various countries have demonstrated the effectiveness of the incident management system in managing large-scale epidemics and disasters [16] [17].

The IMS, which promotes multisectoral integration based on the One Health

approach, continues to face challenges related to data sharing and the harmonization of indicators across different sectors. These constraints have been reported in several other health emergency management contexts [18] [19].

Today, the HEOC is focusing on strengthening its integration into the public health system at both the national and subregional levels. Its priorities also include decentralizing emergency management, notably through the creation of mini-HEOC units in each region, conducting systematic risk assessments at the regional level, and establishing regional rapid response teams.

5. Conclusions

Between 2023 and 2025, the Health Emergency Operations Center demonstrated its ability to prepare for and coordinate effective responses to various public health emergencies. The implementation of Incident Management Systems (IMS) has enabled structured planning, optimal resource allocation, the implementation of infection prevention and control measures, and community awareness and communication activities.

These experiences highlight the importance of continuously strengthening the HEOC's capacities, ensuring multisectoral training for stakeholders, and maintaining an integrated approach to health emergency management to improve the health system's preparedness and resilience in the face of future epidemics. However, the adoption of collaborative surveillance integrated into routine activities and during response efforts could offer a promising approach to strengthening coordination and information sharing through a One Health approach.

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Author Contributions

Conceptualization: Y.B.G. and P.S.D.; Methodology: Y.B.G.; Software: Y.B.G.; Validation: P.S.D., I.D., and D.N.; Formal analysis: Y.B.G.; Investigation: Y.B.G.; Resources: P.S.D.; Data curation: M.N.B. and N.A.S.; Writing—original draft preparation: Y.B.G.; Writing—review and editing: Y.B.G.; Visualization: P.S.D.; Supervision: P.S.D.; Project administration: P.S.D. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

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

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