

Surveillance and Readiness to Respond to Public Health Events of International Concern at Three Major Nigerian Points of Entry: Capacities, Gaps and Post-Ebola Improvements

*Shehu Usman Muhammad^{1,2} Suleiman Usman¹, Suleiman Musa Tanko¹ Abdullahi Hassan^{3,4}

1. Federal University of Health Sciences, Azare, Bauchi State, Nigeria
2. Kaduna Polytechnic, Kaduna State, Nigeria
- 3.. Scientific Research Unit, Federal Medical Centre, Keffi, Nigeria.
4. Institute of Scientific and Health Data Analyst, Abdulgafar Plaza, Abubakar Burga Road, Keffi, Nigeria.

*Corresponding Author: shehu.usman@fusa.edu.ng

Abstract

Background: Surveillance and response to Public Health Events of International Concern (PHEIC) are core capacities under the IHR (2005), requiring designated Points of Entry (POEs) to detect, report, and respond to disease events through standardised, coordinated systems. **Objective:** To assess disease surveillance, laboratory referral capacity, and PHEIC emergency preparedness at Nigeria's busiest airport, seaport, and land border, and the influence of the 2014 Ebola outbreak on subsequent preparedness. **Methods:** A comparative cross-sectional mixed-methods study combined a structured questionnaire (n=122; 41 airport, 41 seaport, 40 land border) with key informant interviews and focus groups at Murtala Muhammed International Airport, Apapa Seaport, and the Seme land border, February-May 2017. **Results:** Disease and event surveillance was not coordinated through any standard routine agreed upon across the POEs; only the land border reported surveillance guided by a drafted contingency plan with a standard operating format. No POE possessed a laboratory facility fit to handle critical emergency cases, and the unavailability of utility vehicles for transporting detected cases constrained surveillance. Simulation exercises had been conducted at air POEs, particularly post-Ebola, and quarterly at the land border, but without key equipment for proper case handling. Mostly, it was WHO or the Federal Government, rather than local surveillance, that alerted port health services to emerging threats, e.g. displaced persons entering from Cameroon. **Conclusion:** Surveillance and PHEIC response readiness at Nigeria's principal POEs remain below IHR (2005) requirements: non-standardised reporting, absent laboratory capacity, and equipment-poor simulations. The post-Ebola rise in simulation activity is a meaningful but incomplete step toward the required capacity.

Keywords: surveillance; public health emergency; PHEIC; Ebola; points of entry; laboratory capacity; emergency preparedness; Nigeria; International Health Regulations

Introduction

Surveillance and response constitute the operational core of IHR (2005): States Parties must develop, strengthen and maintain the capacity to detect, assess, notify and respond rapidly to public health risks and events of international concern, including at designated Points of Entry (POEs).^{1,2} This capacity depends on standardised reporting routines, functional laboratory referral networks, adequate logistics (including transport for specimens and cases), and equipped, rehearsed emergency response plans.³

The 2014 West African Ebola virus disease outbreak placed acute pressure on surveillance and response systems across the region, including at Nigerian POEs through which infected or exposed travellers could plausibly transit. Assessing surveillance and PHEIC response capacity in the years following that outbreak offers insight into both the durable gaps that persisted and any improvements catalysed by the emergency response experience.

This study assesses disease and event surveillance systems, laboratory capacity, and emergency preparedness for PHEIC response at Nigeria's busiest air, sea, and land POEs, drawing on both the practical experience of frontline personnel and the perspective of senior health system managers.

Methods

Design and setting

This descriptive comparative cross-sectional study used mixed quantitative and qualitative methods at Murtala Muhammed International Airport (MMIA), Apapa Seaport, and the

Seme land border in Lagos State, Nigeria, between 20 February and 11 May 2017.

Sample and instruments

A structured, interviewer-administered questionnaire was completed by 122 respondents (41 airport, 41 seaport, 40 land border). Twelve key informant interviews were conducted with Federal Ministry of Health, Port Health Services and WHO Country Office officials, alongside three focus group discussions (10-12 participants each) with frontline staff. Instruments were based on the WHO IHR core-capacity assessment protocol and included an observational checklist enabling the researcher to directly assess the use of personal protective equipment, the availability of isolation rooms, standard laboratories, emergency operation/clinical rooms, and ambulances.

Analysis

Quantitative data were analysed descriptively (frequencies and percentages) in SPSS version 23. Qualitative data from interviews, focus groups, and direct observation were transcribed, coded inductively, and organised into themes.

Ethical considerations

Ethical clearance was obtained from the Kwara State University Institutional Research Board and Publication Committee, with permission from the Federal Ministry of Health, FAAN and the WHO Country Office, Nigeria. Written and verbal informed consent was obtained from all participants.

Results

Disease and event surveillance systems

Disease and event surveillance was not coordinated through any specific routine agreed across all Nigerian POEs; different categories of study participants at different sites reported carrying out practices inconsistent with those at other POEs. Only the Seme land border reported surveillance guided by a recently drafted Public Health Emergency Contingency Plan (PHECP) containing a standard operating format for containing emergencies, in contrast to the absence of any standard reporting format prior to that plan's development. Data collection at POEs relied substantially on existing passenger and conveyance records rather than a dedicated surveillance data system.

Laboratory capacity

No Nigerian POE assessed in this study possessed a laboratory facility fit to handle critical emergency cases in accordance with IHR (2005) requirements. At some air POEs, port health officials reported utilising laboratories provided by the Federal Airports Authority of Nigeria for quick reference checks on uncomplicated cases; elsewhere, dedicated laboratory facilities belonging to port health services or partner agencies were reported as non-existent. Land border respondents reported reliance on personal observation, rather than laboratory confirmation, to identify suspected cases.

Logistics and reporting constraints

Non-availability of utility vehicles for transporting and/or reporting detected cases constituted a significant, consistently cited gap in effective surveillance across Nigerian POEs, a finding that echoes similarly documented logistics constraints at Julius Nyerere International Airport, Tanzania,⁴ and at Ugandan POEs.⁵

Simulation exercises and preparedness

Simulation exercises had been conducted at air POEs, particularly following Nigeria's Ebola virus disease experience, initiated by airport management in conjunction with stakeholders. At the Seme land border, quarterly simulation exercises had been initiated and financed by Pro Health International. However, these exercises were reported as conducted in the absence of key equipment necessary for proper handling of the diseases and emergencies being simulated, meaning they served primarily to build procedural familiarity rather than fully test operational readiness. One air POE respondent noted: "The FAAN is working with us to develop a document on emergency preparedness."

External alerting rather than local detection

In most cases, respondents reported that it was WHO or the Federal Government, rather than site-level surveillance systems, that alerted port health services to emerging threats. Respondents specifically cited a WHO alert to the Federal Government regarding displaced persons entering Nigeria through Cross River State POEs from the southern part of the Republic of Cameroon, illustrating a pattern of externally driven rather than locally generated event detection.

Discussion

This study found that Nigeria's principal POEs lack standardised surveillance routines, dedicated laboratory capacity, and adequately equipped emergency response systems, notwithstanding a documented increase in simulation-exercise activity following the 2014 Ebola outbreak. This pattern of improved procedural rehearsal without commensurate investment in equipment and dedicated laboratory infrastructure suggests that post-Ebola preparedness gains at Nigerian POEs have been partial, addressing process readiness more than the underlying resource base needed for a genuine PHEIC response.

The absence of dedicated, IHR-standard laboratory capacity at every site assessed is a particularly consequential finding, since laboratory confirmation is foundational to accurate case detection and response; reliance on personal observation for case identification, as reported at the land border, carries an elevated risk of both false negatives (missed cases) and false positives (unnecessary containment actions). The recurring reliance on WHO or Federal Government alerts, rather than site-level surveillance, for detecting emerging events further suggests that Nigerian POEs currently function more as receivers of externally generated intelligence than as an active, contributing layer of the national and global surveillance network envisaged under IHR (2005).

These findings are broadly consistent with the WHO Joint External Evaluation of Nigeria (2017),⁶ and with comparable assessments from Tanzania⁴ and Uganda,⁵ indicating that under-resourced surveillance and response capacity at POEs is a recurring, rather than

uniquely Nigerian, challenge in the sub-Saharan African region.

Limitations

As a cross-sectional assessment, this study captures surveillance and preparedness capacity at a specific point in time (2017) and cannot assess whether subsequent investment, including any prompted by the 2017 Joint External Evaluation, has since altered these findings. Observational checklist data were collected by a single researcher, which may introduce observer-dependent variation.

Conclusion and Recommendations

Surveillance and PHEIC response readiness at Nigeria's principal POEs fall short of IHR (2005) requirements, most critically in the absence of dedicated, standard-compliant laboratory facilities and adequately equipped simulation exercises, despite a welcome post-Ebola increase in preparedness activity.

- Establish a standardised, harmonised surveillance and event-reporting format across all designated POEs, extending the land border's PHECP-based model nationally.
- Invest in dedicated, IHR-standard laboratory facilities at POEs, or formalise rapid referral agreements with accredited laboratories where on-site facilities are not feasible.
- Equip simulation exercises with the personal protective equipment, isolation and diagnostic resources needed to test genuine operational readiness, not only procedural familiarity.
- Provide dedicated logistics support, including utility vehicles, for specimen and case transport and reporting at every POE.

- Strengthen locally generated surveillance capacity so that POEs contribute actively to, rather than solely receive, national and international disease intelligence.

Declarations

Ethical approval: This study was approved by the Kwara State University Institutional Research Board and Publication Committee, with further permission obtained from the Federal Ministry of Health, the Federal Airports Authority of Nigeria and the WHO Country Office, Nigeria.

Informed consent: Written and verbal informed consent was obtained from every human participant prior to enrolment, after the purpose of the study was explained and confidentiality was assured.

Consent for publication: Not applicable; no identifying individual data are reported.

Availability of data and materials: The datasets analysed during the current study are available from the corresponding author on reasonable request.

Competing interests: The authors declare that they have no competing interests.

Funding: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

Authors' contributions: SUM conceived the study and drafted the manuscript. SU and SMT assisted in data collection and data analysis and participated in critically revising the manuscript. AH participated in data collection and analyzed data. All authors read and approved the final manuscript.

Acknowledgements: The authors thank the management and staff of MMIA, Apapa

Seaport, the Seme land border Port Health Services, the Federal Ministry of Health and the WHO Country Office, Nigeria.

Copyright notice: This is an open-access article distributed under the terms of the Creative Commons Attribution 4.0 International (CC BY 4.0) License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author(s) and source are credited.

References

1. World Health Organization. International Health Regulations (2005), 3rd edn. Geneva: WHO; 2005.
2. World Health Organization. IHR Core Capacity Monitoring Framework. Geneva: WHO; 2016.
3. Fischer JE, Kornblet S, Katz R. International Health Regulations (2005): Surveillance and Response in an Era of Globalization. Washington DC: Stimson Center Global Health Security Program; 2011.
4. Bakari M, Kilale AM, Kiwelu A, Ndosi F. Assessment of core capacities for the implementation of the International Health Regulations (2005) at Julius Nyerere International Airport, Tanzania. *Tanzan J Health Res.* 2013.
5. Wamala JF, Okot C, Makumbi I, Natseri N, Kisakye A, Nanyunja M, et al. Assessment of core capacities for the International Health Regulations (2005)-Uganda, 2009. *BMC Public Health.* 2010;10(Suppl 1):S9.
6. World Health Organization. Joint External Evaluation of IHR Core Capacities of the Federal Republic of Nigeria. Geneva: WHO; 2017.
7. Kieny MP, Evans DB, Schmets G, Kadandale S. Health-system resilience: reflections on the Ebola crisis in western Africa. *Bull World Health Organ.* 2014;92(12):850.