



Policy and Governance of Disease Surveillance Systems in Nigeria: Addressing Emerging Microbial Threats



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Abstract	Article History
<p>This comprehensive review critically examines the state of microbial epidemiology, disease surveillance policies, and public health response mechanisms in Nigeria. As Africa's most populous nation, Nigeria faces a significant and evolving burden of infectious diseases, including epidemic-prone diseases (cholera, Lassa fever, meningitis), vaccine-preventable outbreaks (diphtheria), and global threats like Antimicrobial Resistance (AMR). The national framework is anchored on the Integrated Disease Surveillance and Response (IDSR) strategy, coordinated by the Nigeria Centre for Disease Control and Prevention (NCDC), which collects and analyzes data to detect outbreaks and inform policy. Despite notable strengths developed through responses to major outbreaks like Ebola and COVID-19, including workforce development and the establishment of a national reference laboratory network, systemic weaknesses persist. These include fragmented data flow, critical gaps in diagnostic and laboratory infrastructure, especially at sub-national levels, inadequate funding, and weak integration of One Health principles. The review highlights promising innovations, such as the launch of Nigeria's first national AMR survey and explorations into wastewater-based epidemiology (WBE). It concludes that while policy frameworks are largely robust, transformative progress hinges on sustained investment in laboratory capacity, digital data systems, antibiotic stewardship, and equitable implementation of surveillance from the national to the local government level. Strengthening these areas is imperative for Nigeria to achieve its health security goals, effectively combat AMR, and build a resilient public health system capable of preventing, detecting, and responding to microbial threats.</p> <p>Keywords: Microbial Epidemiology, Disease Surveillance, Nigeria, Integrated Disease Surveillance and Response (IDSR)</p>	<p>Received: 06 Feb 2026 Accepted: 10 Mar 2026 Published: 15 Mar 2026</p>  <p>Scan QR Code to view¹</p> <p>License: CC BY 4.0²⁴</p>  <p>Open Access article.</p>
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1. INTRODUCTION

Nigeria's public health system operates under the constant strain of a high and diverse burden of infectious diseases. In recent decades, the nation has confronted significant outbreaks of epidemic-prone illnesses including Lassa fever, cholera, meningitis, and diphtheria (Ezea *et al.*, 2024). The arrival of global threats, most notably the COVID-19 pandemic, further exposed systemic vulnerabilities and stretched limited resources thin (Okwor *et al.*, 2025). This challenging landscape is intensified by profound socioeconomic and demographic pressures; a population exceeding 200 million, coupled with high rates of multidimensional poverty, creates conditions that increase population susceptibility and amplify exposure to a wide range of pathogens (Adesola *et al.*, 2025). Compounding these acute outbreaks is the silent, escalating crisis of Antimicrobial Resistance (AMR), which represents a

slow-moving pandemic with severe consequences for treatment outcomes and healthcare costs (Healthcare MEA, 2026).

Effective microbial epidemiology and robust disease surveillance constitute the indispensable foundation for mitigating these threats. A functional surveillance system enables the early detection of outbreaks, guides targeted public health interventions, and monitors the evolution of pathogens, including drug-resistant strains (Nigeria Centre for Disease Control and Prevention, 2025.). For a geographically vast and diverse country like Nigeria, a sensitive and timely national surveillance framework is not merely an administrative function but a critical component of national and global health security (Ameh *et al.*, 2015). The cornerstone of this effort is the Integrated Disease Surveillance and Response (IDSR)

strategy, adopted to streamline reporting and coordinate action across all levels of the health system (Nigeria Centre for Disease Control and Prevention, n.d.). However, the persistent recurrence of outbreaks and the alarming rise of AMR-related deaths indicate significant gaps between policy design and operational reality, underscoring the urgent need for a strengthened system (Ezea *et al.*, 2024).

This review aims to provide a comprehensive synthesis of the current evidence on Nigeria's disease surveillance policies, infrastructure, and practices. It will critically analyze the implementation of the IDSR framework, identifying systemic weaknesses that hinder its effectiveness (Ameh *et al.*, 2015). A particular focus will be placed on the critical gaps in diagnostic and laboratory infrastructure—a major bottleneck for reliable data—and the underdeveloped systems for monitoring Antimicrobial Resistance, which is now recognized as a paramount threat (Okwor *et al.*, 2025; World Health Organization – Nigeria, 2025). Furthermore, the review will examine emerging innovations and strategic future directions, such as wastewater-based epidemiology and digital health integration, that could transform surveillance capabilities (Chukwu *et al.*, 2024). The ultimate goal is to offer a detailed assessment that informs evidence-based policy, highlights priority areas for strategic investment, and contributes to the vital discourse on building a more resilient public health system for Nigeria (Adesola *et al.*, 2025).

2. THE POLICY AND STRATEGIC FRAMEWORK FOR DISEASE SURVEILLANCE

2.1 Historical Evolution and the Integrated Disease Surveillance and Response (IDSR) System

The formal architecture for disease surveillance in Nigeria was established in response to a major yellow fever outbreak in 1986/87, which revealed the absence of a coordinated national reporting system. This led to the creation of a national notifiable disease system, which was later streamlined and revolutionized by adopting the World Health Organization's (WHO) Integrated Disease Surveillance and Response (IDSR) strategy in the early 2000s. The IDSR strategy is designed to integrate multiple, vertical disease-specific surveillance systems into a single, cohesive framework to promote efficiency, rational use of resources, and timely action.

The Nigeria Centre for Disease Control and Prevention (NCDC) is the central agency mandated to coordinate this system. Its Surveillance Directorate is responsible for "collect[ing], collat[ing] and analyz[ing] data on priority diseases from the 36 states and FCT to detect outbreaks and inform policy". The IDSR system in Nigeria focuses on 40 priority communicable and non-communicable diseases and conditions, categorized as epidemic-prone diseases, diseases targeted for eradication/elimination, and other diseases of public health importance. A core principle of IDSR is its emphasis on the Local Government Area (LGA) as the first line of detection and response, where "information generated is used for timely action consequently leading to reduction of morbidity, disability and mortality".

2.2 Data Flow and Reporting Mechanisms

The theoretical flow of surveillance data in Nigeria's IDSR system follows a hierarchical pathway:

- **Detection at Health Facility/Community:** Clinicians and healthcare workers at primary healthcare centers and hospitals are required to immediately report suspected cases of notifiable diseases using standard case definitions.
- **LGA Level:** The Disease Surveillance and Notification Officer (DSNO) at the LGA collates reports from facilities and communities.
- **State Level:** The State Ministry of Health (SMoH) Epidemiology unit receives LGA data, conducts analysis, and provides feedback.
- **National Level:** The NCDC's Surveillance Directorate collates national data, conducts analysis, and disseminates information through tools like the Weekly Epidemiological Report.

The system employs multiple surveillance modalities:

- **Indicator-Based Surveillance:** This is the routine reporting of notifiable diseases via immediate, weekly, and monthly forms.
- **Event-Based Surveillance (EBS):** The NCDC also maintains an EBS system to "detect[] and verify[] rumours relating to diseases and outbreaks," leveraging informal community reports for early warning.
- **Laboratory-Based Surveillance:** This involves the confirmation of suspected cases through the national laboratory network, a critical component for accurate diagnosis and monitoring.

However, significant challenges disrupt this ideal flow. A persistent weakness is the inconsistent involvement of frontline clinicians, attributed to poor awareness of reporting requirements, which diseases are notifiable, and the correct reporting channels. Furthermore, the system is undergoing a critical transition toward digitization, with the first phase of an electronic reporting system active in only 16 of Nigeria's 36 states as of recent reports, indicating a significant digital divide.

3. CORE CHALLENGES IN SURVEILLANCE IMPLEMENTATION AND INFRASTRUCTURE

3.1 Diagnostic and Laboratory Infrastructure Gaps

A robust surveillance system is fundamentally dependent on reliable diagnostic capacity. Here, Nigeria faces profound challenges that severely limit the sensitivity and timeliness of disease detection. An assessment of the system's preparedness for Mpox surveillance is illustrative of broader issues: despite having 85 approved public laboratories, only 63 are equipped for PCR testing, and these are predominantly concentrated in urban areas. This creates "a significant challenge in achieving comprehensive nationwide...detection and surveillance," leading to underreporting.

- **Inequitable Geographic Distribution:** Laboratories in Nigeria are overwhelmingly concentrated in urban centers and tertiary hospitals, leaving a critical scarcity of functional facilities in rural areas and at primary and secondary levels of care. This maldistribution creates significant surveillance "blind spots," delays the transport and testing of samples, and results in the missed detection of community-level transmission.

- **Critical Workforce and Capacity Deficits:** The system is further hampered by a severe shortage of trained medical laboratory scientists, compounded by high rates of emigration and insufficient biosafety training. These workforce challenges directly limit testing throughput, increase turnaround times for critical results, and elevate biosafety risks within laboratories.
- **Fragile Operational Logistics:** Unstable power supply, inconsistent supply chains for essential reagents and test kits, and inadequate transportation networks for sample referral are persistent operational hurdles. These logistical failures cause frequent interruptions in laboratory services, lead to stock-outs, and ultimately delay the reporting of results to public health authorities.
- **Outdated Technology and Data Management:** A reliance on handwritten registers in many laboratories and a widespread lack of digital infrastructure for data management remain major barriers. This technological deficit severely hinders data quality and completeness, and prevents real-time electronic reporting to national surveillance systems, slowing the overall public health response.

The COVID-19 pandemic catalyzed a rapid, albeit uneven, expansion of molecular testing capacity from just 3 laboratories in March 2020 to 124 centers by April 2021. While this demonstrated commendable adaptability, it also strained existing systems and highlighted pre-existing inequities. Post-pandemic, sustaining these gains and ensuring equitable distribution of resources remains a critical challenge.

3.2 The Antimicrobial Resistance (AMR) Surveillance Crisis

AMR represents a paradigmatic challenge for microbial epidemiology, requiring sophisticated, integrated surveillance across human, animal, and environmental sectors (One Health). Nigeria's burden is staggering, with one of the highest mortality rates from AMR globally. A recent Africa CDC study analyzing data from 2016-2019 found alarming resistance rates in Nigeria, including methicillin-resistant *Staphylococcus aureus* (MRSA) in over 70% of samples and widespread resistance among other critical pathogens.

The surveillance system for AMR is characterized by critical gaps:

- **Limited Routine Testing:** "Less than two per cent of all assessed health facilities could test for bacterial infections" in Africa, a statistic that reflects Nigeria's reality where testing capacity is largely confined to tertiary centers.
- **Fragmented Data:** AMR data collection is inconsistent. A major review noted that "only 12 per cent of resistance records included patient information," crippling efforts to understand risk factors and trends.
- **Weak Linkages to Policy:** Despite having a National Action Plan on AMR, implementation is hampered by unregulated antibiotic sales, widespread self-

medication, and limited antibiotic stewardship programs in healthcare facilities.

Recognizing this crisis, Nigeria, with WHO support, has launched its first nationally representative AMR survey, a landmark initiative aiming to establish a baseline, strengthen laboratory capacity, and generate evidence for policy. This survey represents a critical step toward filling the vast data void.

3.3 Systemic and Governance Weaknesses

Beyond infrastructure, broader systemic issues weaken surveillance. A 2024 narrative review of Nigeria's outbreak responses identified chronic inadequate funding as a primary constraint. Health sector funding often falls short of commitments, limiting everything from reagent purchases to transportation for sample collection and salaries for surveillance officers at the LGA level.

Furthermore, there is poor coordination at the subnational level and a lack of integration between the animal and human health sectors, undermining the One Health approach essential for zoonotic diseases like Lassa fever and Mpox. These weaknesses manifest in delayed detection and response, as evidenced by the persistence of cholera outbreaks and the resurgence of diphtheria.

4. INNOVATIONS AND EMERGING APPROACHES IN SURVEILLANCE

In response to these challenges, Nigeria is exploring and adopting innovative surveillance methodologies.

4.1 Wastewater-Based Epidemiology (WBE): WBE involves monitoring sewage for pathogens and offers a non-invasive, cost-effective way to surveil entire communities. A pioneering 2022 study of wastewater canals in Lagos State demonstrated its feasibility in the Nigerian context. The study detected a range of priority pathogens, including *Escherichia coli* (28.5%), *Salmonella* spp. (16.3%), *Vibrio cholerae* (10.6%), and non-tuberculous mycobacteria across 15 of 20 LGAs. Critically, it found a high prevalence (87.5%) of Extended-Spectrum Beta-Lactamase (ESBL) genes in wastewater, providing a novel environmental signal of community AMR pressure. The study concluded that WBE "provides evidence to inform policy and strategies for wastewater monitoring and treatment" for epidemic prevention.

4.2 Digital Health and Data System Modernization: The NCDC's ongoing efforts to digitize its reporting system are crucial. Transitioning from paper-based forms to electronic data capture can dramatically improve the timeliness, completeness, and quality of surveillance data. This must be coupled with investments in digital infrastructure at peripheral laboratories to enable direct, automated reporting of laboratory-confirmed cases.

4.3 Enhanced International and Domestic Partnerships: Recent developments signal increased commitment to overcoming these challenges. The landmark \$2 billion Memorandum of Understanding (MoU) with the United States (2026-2030) is specifically targeted at strengthening disease surveillance systems, laboratory

systems, and data systems. Concurrently, Nigeria has committed to increasing its domestic health budget allocation, aiming to reduce dependence on external aid. Furthermore, Nigeria's role in hosting the 5th Global High-Level Ministerial Conference on AMR in Abuja in 2026 provides a unique platform to advocate for equitable resources and focus global attention on the AMR challenges faced by low- and middle-income countries.

5. CONCLUSIONS AND RECOMMENDATIONS

Nigeria's disease surveillance policy framework, centered on the IDSR strategy, is conceptually sound and aligned with international best practices. The country has developed notable institutional strengths through firefighting major outbreaks, as evidenced by its successful containment of imported Ebola in 2014 and the rapid scaling of COVID-19 testing. However, this review reveals a persistent and dangerous gap between policy aspiration and operational reality.

Effective microbial epidemiology is crippled by a diagnostic infrastructure that is inequitably distributed, under-resourced, and overburdened. Surveillance for AMR—one of the greatest modern health threats—is in its infancy, hampered by a lack of routine testing and coherent data. The flow of information from the point of care in a remote clinic to decision-makers in Abuja is often slow, incomplete, or fractured due to systemic underfunding, workforce shortages, and logistical hurdles.

To bridge this gap, Nigeria must prioritize a multi-pronged strategy:

- **Sustain and Deepen Investment in Laboratory Systems:** Funding must be directed toward decentralized, quality-assured laboratory capacity at the state and LGA levels, ensuring stable reagent supply chains, reliable power, and a skilled workforce retained through competitive incentives.
- **Fully Operationalize the One Health Approach:** This requires formalizing coordination mechanisms between the Federal Ministry of Health, the Ministry of Agriculture, and environmental agencies to enable integrated surveillance of zoonotic diseases and AMR.
- **Accelerate Digital Transformation:** The nationwide rollout and maintenance of electronic surveillance data systems are non-negotiable for achieving real-time disease intelligence.
- **Institutionalize AMR Surveillance and Stewardship:** The national AMR survey must be the foundation for a sustainable, routine surveillance system embedded within the NCDC network. Concurrently, stringent policies to regulate antibiotic sales and promote stewardship in all healthcare facilities are urgently needed.
- **Explore and Integrate Innovative Tools:** Piloting and scaling innovations like WBE for cholera and

AMR monitoring, and leveraging genomics for pathogen tracking, can provide complementary data streams for proactive public health action.

The convergence of new funding partnerships, high-level political attention on AMR, and lessons from recent pandemics presents a pivotal opportunity. By translating these recommendations into concrete, funded actions, Nigeria can build a truly resilient surveillance system that not only protects the health of its own population but also fulfills its critical role in global health security.

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