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Bridging Surveillance Gaps in Nigeria's Polio Programme: Policy Lessons from the April 2025 National Immunization Plus Days

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Abstract

Although Nigeria was certified free of indigenous wild poliovirus in 2020, recurrent outbreaks of circulating vaccine-derived poliovirus type 2 continue to expose operational weaknesses in surveillance sensitivity, campaign implementation, and subnational outbreak preparedness. This policy analysis examined acute flaccid paralysis surveillance performance during the April 2025 National Immunization Plus Days in Nigeria by synthesizing routinely collected programme monitoring data, geo-verification outputs, Lot Quality Assurance Sampling results, operational implementation reports, and national AFP surveillance indicators. The analysis showed that national surveillance indicators exceeded recommended thresholds, with a non-polio AFP rate of 11.9, stool adequacy of 99%, and non-polio enterovirus detection rate of 12.1%. However, programme-level evidence revealed important implementation gaps. Only 71% of targeted settlements had documented geo-verification, leaving nearly one-third without verifiable evidence of field reach, while 88% of Local Government Areas met the ≥90% LQAS campaign-quality threshold. Operational reports further identified weaknesses in supervision, logistics, data quality, reporting timeliness, community engagement, and feedback systems. The reduction in states reporting poliovirus detections from 15 to 9 was interpreted cautiously as a signal requiring further investigation rather than definitive evidence of reduced transmission. The findings demonstrate that favourable national surveillance indicators may coexist with localized geographic and operational gaps that can weaken early detection and outbreak response. Strengthening Nigeria's polio surveillance system therefore requires geo-enabled monitoring, independent validation of campaign performance, community-based case detection, data-quality assurance, supervisory accountability, and integrated digital reporting systems. These reforms are essential for sustaining Nigeria's polio-free status, improving detection of vaccine-derived poliovirus transmission, and reinforcing broader public health emergency preparedness.

Keywords: Acute Flaccid Paralysis, Circulating Vaccine-derived Poliovirus Type 2, Disease Surveillance, Geo-verification, Lot Quality Assurance Sampling, National Immunization Plus Days, Nigeria, Outbreak Preparedness

INTRODUCTION

Nigeria's certification as free of indigenous wild poliovirus in August 2020 represented a landmark achievement in global public health, reflecting decades of sustained immunization campaigns, multisectoral collaboration, and community engagement (World Health Organization [WHO], 2020a). Despite this milestone, subsequent outbreaks of circulating vaccine-derived poliovirus type 2 (cVDPV2) have exposed persistent weaknesses in population immunity and disease surveillance, particularly in underserved and conflict-affected areas where immunization coverage remains suboptimal (WHO, 2022; National Primary Health Care Development Agency [NPHCDA], 2023a; Cooper *et al.,* 2024; Namageyo-Funa *et al.,* 2024; Abdulraheem *et al.,* 2025a-c). Rather than representing isolated epidemiological events, these outbreaks underscore continuing challenges in surveillance sensitivity, equitable vaccine delivery, and timely outbreak detection.

They also highlight the importance of maintaining robust surveillance systems even after elimination of wild poliovirus, as vaccine-derived polioviruses continue to emerge where immunity gaps persist (Global Polio Eradication Initiative [GPEI], 2025). Acute flaccid paralysis (AFP) surveillance remains the cornerstone of global poliovirus detection and eradication strategies because it provides the primary mechanism for identifying poliovirus circulation before widespread transmission occurs (WHO, 2021; GPEI, 2023). High-quality AFP surveillance depends not only on laboratory performance but also on comprehensive community-based case detection, timely reporting, effective supervision, and rapid field investigation. Failure to detect AFP cases promptly, particularly in hard-to-reach communities, can permit prolonged silent transmission and delay outbreak response (WHO, 2021; GPEI, 2025).

Consequently, surveillance performance is widely recognized as both an early warning system and a key indicator of health system resilience and preparedness. Nigeria currently reports surveillance indicators that exceed internationally recommended performance thresholds, including a non-polio AFP (NP-AFP) rate of 11.9, stool adequacy of 99%, and a non-polio enterovirus (NPENT) detection rate of 12.1% (NPHCDA, 2023b). Although these national indicators suggest strong surveillance performance, aggregated statistics may conceal important subnational disparities in surveillance sensitivity, laboratory access, and operational effectiveness, particularly in areas affected by insecurity, difficult terrain, population displacement, and weak routine immunization services (Raimi *et al.,* 2019a; Elemuwa *et al.,* 2024b; Cooper *et al.,* 2024). These disparities are further illustrated by a reduction in the number of states reporting poliovirus detections from 15 to 9, representing an approximately 47% decline in geographic detection. Rather than necessarily indicating reduced virus circulation, this pattern may reflect surveillance blind spots and diminished case detection capacity. The continued identification of orphan poliovirus isolates, genetically divergent viruses lacking known epidemiological links, provides additional evidence that undetected transmission may still be occurring within surveillance gaps (GPEI, 2023; Namageyo-Funa *et al.,* 2024; Mordecai *et al.,* 2024). Growing evidence demonstrates that strengthening community-based surveillance substantially improves early detection of poliovirus transmission and enhances outbreak response in resource-constrained settings (Joshua *et al.,* 2024; Sawyerr and Raimi, 2025; Opasola and Raimi, 2025).

Community informant networks, digital reporting platforms, geo-enabled monitoring, social listening, and real-time feedback mechanisms have increasingly been recognized as essential complements to conventional AFP surveillance systems (Raimi *et al.,* 2020; Uchenna *et al.,* 2024; GPEI, 2023). Comparable approaches have strengthened surveillance and community engagement during responses to other infectious diseases, including human papillomavirus vaccination programmes, Mpox, and Lassa fever (Elemuwa *et al.,* 2024a; Elemuwa *et al.,* 2024b; Abaya *et al.,* 2024). Nevertheless, persistent vaccine hesitancy, misinformation, operational fatigue following the COVID-19 pandemic, and weaknesses in frontline supervision continue to undermine surveillance quality and immunization performance in many settings (Raimi *et al.,* 2021a, c; Kakwi *et al.,* 2024a; 2025; Morufu *et al.,* 2021c). Addressing these challenges requires surveillance systems that extend beyond routine performance indicators to emphasize accountability, equity,

community participation, and evidence-informed decision-making.

Although routine surveillance indicators are regularly reported, relatively few policy analyses have critically examined how operational programme evidence, including geographic verification of campaign reach, Lot Quality Assurance Sampling (LQAS) findings, and documented implementation challenges, can complement conventional surveillance metrics to identify weaknesses requiring corrective action. This gap is particularly important in the context of Nigeria's continuing cVDPV2 outbreaks, where programme performance indicators may not fully reflect field-level realities. Accordingly, this policy analysis critically examines evidence generated during the April 2025 National Immunization Plus Days (NIPDs), integrating geo-verification data, LQAS findings, operational implementation reports, and national AFP surveillance indicators to identify critical weaknesses in surveillance performance and outbreak preparedness. The study further proposes evidence-informed policy actions to strengthen surveillance quality, improve early poliovirus detection, and support the long-term sustainability of Nigeria's polio eradication achievements.

Policy Problem

Despite national surveillance indicators that exceed internationally recommended performance thresholds, including a non-polio acute flaccid paralysis (NP-AFP) rate of 11.9, stool adequacy of 99%, and a non-polio enterovirus (NPENT) detection rate of 12.1%, Nigeria continues to experience substantial subnational disparities in surveillance performance (NPHCDA, 2025). These disparities are particularly evident in areas affected by insecurity, difficult terrain, weak infrastructure, and limited community engagement (Elemuwa *et al.,* 2024; Elemuwa *et al.,* 2024b; Teddy *et al.,* 2025; Sawyerr and Raimi, 2025; Opasola and Raimi, 2025; Adiama *et al.,* 2025). While national indicators suggest that the surveillance system is performing satisfactorily overall, they may mask important operational weaknesses at the Local Government Area (LGA) level, where underrepresentation in active case detection, uneven surveillance capacity, and inconsistent programme implementation remain persistent challenges. These surveillance inequities reduce confidence that national performance indicators fully reflect field realities and may limit the timely identification of poliovirus transmission in underserved communities. One of the most important policy concerns is the incomplete geographic verification of vaccination and surveillance activities. During the April 2025 National Immunization Plus Days (NIPDs), programme reports indicated that only 71% of targeted settlements were geo-referenced and supported by verifiable field evidence, leaving nearly 30% without documented geographic verification (NPHCDA, 2025) (Figure 1). Although geo-verification does not directly measure vaccination coverage or AFP surveillance sensitivity, it provides an important indicator of whether planned settlements were reached and documented during campaign implementation.

Consequently, incomplete geographic verification introduces uncertainty regarding population reach and increases the possibility that some communities remain underserved or insufficiently monitored. In the absence of updated settlement maps, comprehensive geo-validation, and real-time reporting systems, frontline health workers may face challenges confirming whether all targeted settlements were visited and whether AFP cases were consistently identified, investigated, and reported (Raimi *et al.,* 2020; Elemuwa *et al.,* 2024; Elemuwa *et al.,* 2024b). A second policy challenge relates to interpreting surveillance performance independently from campaign coverage. During the same April 2025 NIPDs, the number of states reporting poliovirus detections declined from 15 to 9, representing an approximate 47% reduction in geographic detection (NPHCDA, 2025). Although this pattern may reflect changing epidemiological dynamics, it may also indicate variations in surveillance sensitivity, specimen collection, laboratory performance, reporting practices, or access to underserved populations. Therefore, reductions in reported detections should not automatically be interpreted as evidence of reduced poliovirus transmission without complementary surveillance evidence (Raimi and Ochayi, 2017; Kakwi *et al.,* 2024a; Kakwi *et al.,* 2024b; Okechukwu *et al.,* 2024).

Additional concern arises from the continued detection of "orphan viruses," poliovirus isolates lacking known epidemiological links to previously

identified transmission chains (GPEI, 2023). These genetically distinct isolates are recognized indicators of surveillance gaps because they suggest that virus transmission may have occurred without timely detection. Although orphan viruses do not, by themselves, prove surveillance failure, they provide molecular evidence that portions of transmission networks may have escaped routine surveillance activities (Raimi and Raimi, 2020; Samson *et al.,* 2020; Raimi *et al.,* 2021a; Raimi *et al.,* 2021c; Morufu *et al.,* 2021b). Collectively, these findings suggest the presence of surveillance blind spots requiring targeted operational attention. Operational performance during the April 2025 NIPDs further highlights implementation challenges that may weaken surveillance effectiveness. Field reports documented insufficient supervisory presence, fragmented reporting structures, and inadequate support for community informant networks, particularly in high-burden LGAs (Table 1) (Uchenna *et al.,* 2024; Abaya *et al.,* 2024; Christopher *et al.,* 2024; Ibrahim *et al.,* 2025; NPHCDA, 2025). In several locations, community informants received limited training or support for AFP case reporting, while supervisory personnel were inconsistently deployed or insufficiently familiar with local community dynamics. These operational constraints may delay case notification, compromise specimen collection, and reduce the timeliness and completeness of epidemiological investigations (Elemuwa *et al.,* 2024; Raimi *et al.,* 2020; Promise *et al.,* 2025). Such findings demonstrate that campaign implementation quality and AFP surveillance performance, although closely related, represent distinct components of programme effectiveness and should be interpreted separately. The absence of robust real-time feedback mechanisms further limits programme responsiveness. Many field teams continue to operate with delayed access to surveillance information, limiting opportunities for rapid corrective action and reducing the exchange of operational lessons between LGAs. Consequently, implementation challenges identified during one campaign may persist into subsequent rounds, contributing to repeated weaknesses in surveillance quality, supervision, and immunization delivery (Opasola and Raimi, 2025; Raimi *et al.,* 2021b; Christopher *et al.,* 2024). Taken together, these findings indicate that Nigeria's principal policy challenge is not simply achieving favourable national surveillance indicators, but ensuring that surveillance quality, geographic coverage, operational implementation, and outbreak detection remain consistently strong across all communities.

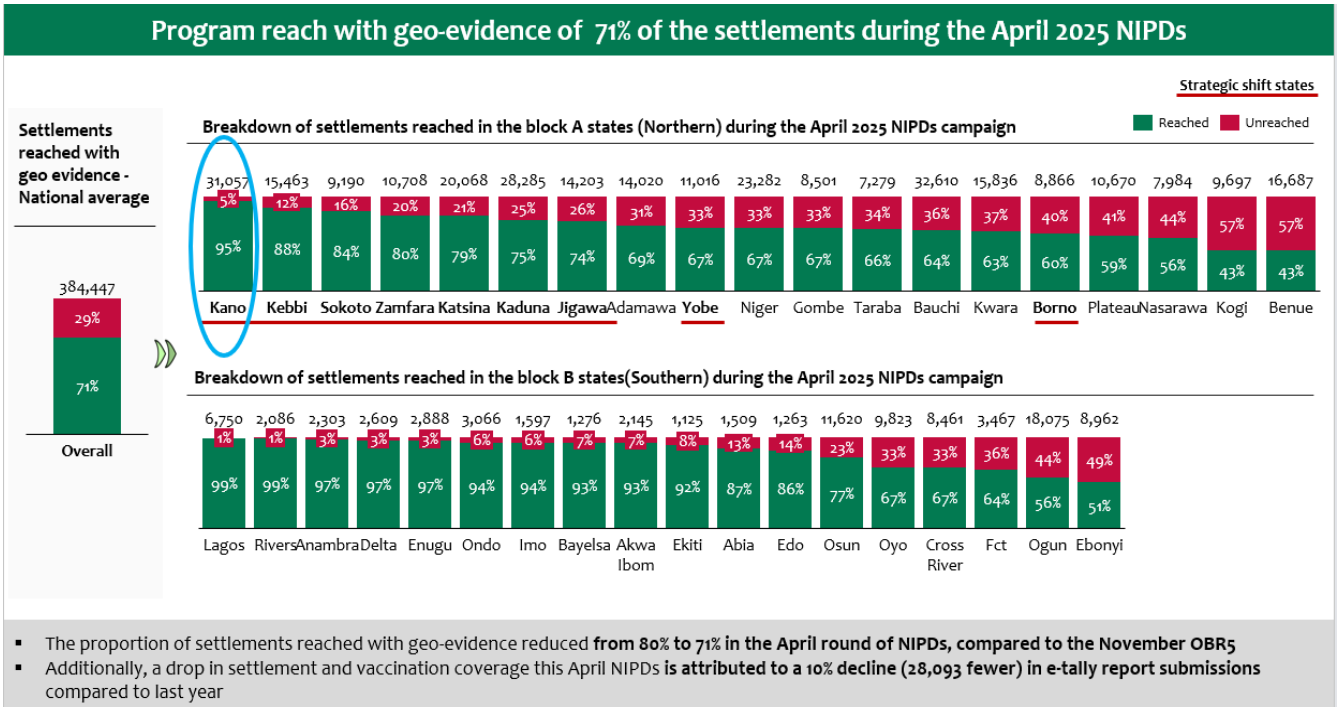

Figure 1: Program reach with Geo-evidence of 71% of the Settlements During the April 2025 NIPDS
Source: eTally Submission, MLOS, GTS tracker

Addressing these persistent gaps will require surveillance systems that are more equitable, community-centred, digitally enabled, and operationally accountable. Strengthening geo-enabled verification, improving data feedback loops, supporting frontline surveillance personnel, and reinforcing community-based reporting mechanisms are essential policy priorities for sustaining Nigeria's polio-free status and strengthening preparedness for future public health emergencies (Raimi *et al.,* 2019b; Morufu *et al.,* 2021c; Joshua *et al.,* 2024; Abaya *et al.,* 2024; Elemuwa *et al.,* 2024a; Elemuwa *et al.,* 2024b; Sawyerr and Raimi, 2025; Promise *et al.,* 2024).

Table 1 summarizes key operational challenges observed during the April 2025 NIPDs and groups them into broad accountability themes. The table is included to demonstrate how field-level implementation constraints may affect surveillance quality, campaign reliability and outbreak preparedness. It should be interpreted as an operational policy table rather than as a statistical results table.

METHODS

Study Design

This study was conducted as an evidence-informed policy analysis of Nigeria's acute flaccid paralysis (AFP) surveillance performance during the April 2025 National Immunization Plus Days (NIPDs). Unlike primary epidemiological investigations, the analysis did not involve prospective participant recruitment, field data collection, or experimental intervention. Rather, it critically synthesized routinely collected programme monitoring data, national surveillance indicators, and operational implementation reports to evaluate surveillance performance, identify operational bottlenecks, and inform policy options for strengthening poliovirus surveillance and outbreak preparedness.

Data Sources

The analysis was based on routinely collected programme information generated during the April 2025 NIPDs and complementary national AFP surveillance reports. The principal data sources included:

i. programme geo-verification reports documenting settlement-level geographic reach;
ii. Lot Quality Assurance Sampling (LQAS) monitoring results assessing campaign quality across Local Government Areas (LGAs);
iii. AFP surveillance performance indicators, including the non-polio AFP (NP-AFP) rate, stool adequacy, and non-polio enterovirus (NPENT) detection rate;
iv. operational monitoring reports documenting implementation challenges, supervisory findings, logistics performance, and community engagement activities; and
v. relevant national and international guidance documents on AFP surveillance, poliovirus outbreak response, and surveillance quality issued by the National Primary Health Care Development Agency (NPHCDA), the World Health Organization (WHO), and the Global Polio Eradication Initiative (GPEI).

To strengthen interpretation of programme findings, these data were contextualized using contemporary peer-reviewed literature on circulating vaccine-derived poliovirus type 2 (cVDPV2), AFP surveillance systems, and immunization campaign quality, including recommended methodological guidance for LQAS and poliovirus surveillance (Brown *et al.,* 2014; Greenland *et al.,* 2011; GPEI, 2023; Cooper *et al.,* 2024; Namageyo-Funa *et al.,* 2024). Additionally, in order to improve transparency and reproducibility, the programme indicators used in this policy analysis were interpreted according to their operational definitions. Geo-verification referred to the proportion of targeted settlements for which field teams provided GPS-enabled evidence of visitation during the April 2025 NIPDs. LQAS performance referred to the proportion of surveyed LGAs that met the programme decision threshold of at least 90% campaign quality. AFP surveillance performance was interpreted using established programme indicators, including the non-polio AFP rate, stool adequacy and non-polio enterovirus detection rate. These indicators were not treated as interchangeable measures; rather, they were triangulated to distinguish campaign reach, campaign quality, surveillance sensitivity and operational implementation performance.

Table 1: Execution Challenges were observed and require accountability measures

Themes	Issues Identified	State Affected	Responsible Agency	Color Code	Proposed Action
Funding & Logistics	***Noodles not available due to manufacturer not being able to meet the demand***. Out of 14 states, only Katsina used noodles for April round. A day to campaign: • 5 states received full quantity • 2 states did not received noodles • 7 states received partial quantity (between 4-99%) of required number of noodles	2 States with no noodles – Adamawa & Zamfara. 7 states with partial quantity – Kano, Kaduna, Bauchi, Sokoto, Katsina, Gombe & Taraba	WHO	🟡 Yellow	**WHO Team Lead:** Validate if current manufacturer has sufficient quantity to meet next round & if not what the alternative is **NEOC:** Engage state EOC to send current stock of noodles & guarantee stock levels remain same till round 2 campaign
	Political Interference limiting adherence to new guidelines 9 out of 44 LGAs in Kano did not follow new protocol due to LGA Chairman wanting to select their own nominees	9LGAs	LGA Chairman	🟡 Yellow	**ED:** Escalate to Kano state governor * traditional leaders (Emir) with list of 9LGAs
				🔵 Blue	**NEOC:** Rivise the team selection. SOP to allow nominations from all relevant stakeholders, with traditional leaders (TL) responsible for compilation & screening
Team Selection	Training SOP 27% (683/2593) of ward trainings had independent observers absent due to IOs not training on time (Sokoto) & impromptu scheduling in Jigawa & Kaduna Delays in team selection after post training test due to centralized results	9 States	Ips Jigawa/Kaduna SEOC WHO	🟡 Yellow 🔵 Blue	**NEOC:** Communication to Ips & SEOC with locations where training protocol not followed indicating that Ios must be present for vaccination team trainings going forwards. **IPs:** Prioritize locally-based independents observers despite non-affiliations to institutions WHO: Grant Ips direct access to post-test scores & dashboard
Team Selection	**Training Quality** • 19% of ward trainings were overcrowded due to insufficient locations • 30% of ward trainings had no traditional leaders (Mai Ungwas)	9 States	SEOC Traditional leaders, district head	🟡 Yellow 🔵 Blue	**NEOC:** Communities to SEOCs to increase # of days allocated to training & ensure only 40 participants per classroom **ED:** Communicate list of wards where TL not present to traditional leaders (Emirs) for further action **WHO:** Conduct refreshers trainings for teams used in round 1, with emphasis on the areas struggled with
	Absenteeism Team with absent recorders (4%), absent vaccinators (9%) & absent community leaders (16%)	9 State	Traditional leaders, district head	🟡 Yellow	**NEOC:** Share list of teams with traditional leaders (Emirs) for their action & indicating that these team members will be disbanded from future campaigns
Team Supervision	Poor Quality of information to due quality of nominees, training limitations & demanding scope of activities • 23% of ITS/ICS did not report on ODK • 80% of ITS/ICS reported incomplete/wrong data on Day 1 of the campaign • Attrition of independent supervisors • Limited effective supervision from ICS due to 1:3 ratio	9 States	NEOC & Supervision Ips-Recruiting	🟡 Yellow	**NEOC:** Communication to institutions to emphasize and adherence to criteria & to IPS to disband ICS who did not report on ODK (following investigation) & reiterate end to end responsibility
				🔵 Blue	**WHO:** Conduct refresher training on key gaps from round 1. **Acasus:** Design & implement validation process for issues raised by ICS/ITSN. **NEOC:** Simplify ICS/ITS activities to assessing data quality, fake finger making & vaccine dumping & switch supervision model of ICS from supervising 3 teams per day to 1 team per day
	Fake finger marking, Data falsification & vaccine misuse 4% of validated teams involved in fake finger marking, 7% vaccine misuse & 3% data falsification	9 States	Vaccination Team	🟡 Yellow	**ED:** Communication to Governors, SEOCs & Emirs (through NTLC representatives) to ensure teams involved in malpractice following investigation are dropped & blacklisted from future campaign
IE/ Microplanning	IE data for microplanning Where available. IE data wasn't used for workload planning due to limited time for states to validate data with WHO	All 6 IE State	IE IPs	🟡 Yellow	Ips: Complete mop up of IE before May 13th
	ACSM Implementation delays Three weeks pre-campaign, only 44% (133/360) of wards had begun ACSM activities, but only 11% (39/360) had completed all required steps	6 States 60 LGAs	LGA Health Educators	🟡 Yellow	ED: Communicate list of wards to state health commissioners, ES & deputy governors stating that activities need to be completed in round 2
				🟡 Yellow	NEOC: Communicate list of wards & LGAs to SEOC to take further action.
ACSM	***Limited visibility into CSO led activities*** 20% (16/80) of engaged CSOs did not report/track ACSM activities because they were deployed late	4 States	IPS/CSOs	🔵 Blue	UNICEF: Conduct refresher trainings for CSOs & enhance supportive supervision from IPS
Data	Data related Issues • Lack of synergy between PCDB & the reality on ground. • Sub-optimal training on data tools & ODK checklists at the lower levels • Late submission of call in data & e-tally • Poor utilization of e-tally ODK lists • Utilizing older version of e-tally & MST ODK checklists • Data panel beating (falsification)	All States	State teams		Activities should be validated before being updated on the PCDB Ensure lower-level trainings includes a dedicated session on data tools & Management Submission of call in data by 3pm & e-tally & MSTs checklists are used during campaigns All forms of data falsification should be discouraged MSTs to fill data quality checklist

🟡 Accountability Measure 🔵 Blue Design Enhancement

Source: ACSM Monitoring Tools

Data Access and Administrative Authorization

The analysis utilized routinely collected programme monitoring data generated during the April 2025 National Immunization Plus Days (NIPDs) coordinated by the National Primary Health Care Development Agency (NPHCDA), Nigeria. Access to these data was obtained through administrative authorization associated with official programme responsibilities. The dataset comprised aggregated programme information, including AFP surveillance indicators, geo-verification outputs, Lot Quality Assurance Sampling (LQAS) results, and operational monitoring reports. No individual-level or personally identifiable information was accessed or analyzed. Because this study involved secondary analysis of routinely collected, aggregated programme data collected as part of standard public health practice, it did not involve direct human participant research and therefore did not require formal institutional ethical review. All analyses were undertaken in accordance with applicable programme reporting procedures and ethical principles governing the responsible use of public health surveillance data.

Geo-verification Methodology

Programme geographic coverage was assessed using geo-verification data generated during the April 2025 NIPDs. Field teams recorded visits to targeted settlements using Global Positioning System (GPS)-enabled devices that documented the geographic coordinates of visited settlements. These geo-tagged records were subsequently compared with established settlement denominators used for campaign microplanning to determine the proportion of targeted settlements with verifiable field evidence of visitation. For this policy analysis, geo-verification was interpreted as an implementation monitoring indicator reflecting documented campaign reach rather than a direct measure of vaccination coverage or AFP surveillance sensitivity. Consequently, incomplete geo-verification was considered indicative of potential operational gaps requiring further investigation rather than definitive evidence of missed vaccination or surveillance failure.

Lot Quality Assurance Sampling Methodology

Campaign quality was evaluated using Lot Quality Assurance Sampling (LQAS), a rapid monitoring approach widely used by the Global Polio Eradication Initiative to assess the quality of supplementary immunization activities (Brown *et al.,* 2014; Greenland *et al.,* 2011). Within the NIPDs programme, each LGA constituted a surveillance lot for post-campaign quality assessment. Household sampling was conducted according to established programme protocols, and LGAs were classified using the operational decision threshold of ≥90% vaccination coverage, consistent with international programme standards. Because LQAS is designed as a classification rather than a prevalence estimation method, the resulting classifications were interpreted as indicators of campaign quality rather than precise estimates of vaccination coverage. Accordingly, LQAS findings were interpreted alongside geo-verification results, AFP surveillance indicators, and documented operational observations to provide a more comprehensive assessment of surveillance performance.

Analytical Approach

A narrative policy analysis framework was employed to synthesize evidence across multiple programme data sources. Figures 1 and 2 and Table 1 were examined collectively rather than independently to evaluate the consistency between campaign implementation, surveillance performance, and operational challenges. Figure 1 was interpreted to assess documented geographic reach and implementation coverage based on geo-verification results. Figure 2 was evaluated in relation to LQAS classification outcomes while recognizing the methodological limitations of LQAS as a rapid programme monitoring tool. Table 1 was analysed to identify recurrent operational constraints affecting surveillance implementation, including supervision, reporting systems, logistics, data management, and community engagement. These programme findings were subsequently compared with national AFP surveillance indicators, including the NP-AFP rate, stool adequacy, NPENT detection rate, and reported geographic distribution of poliovirus detections, to determine whether favourable national performance indicators adequately reflected field-level operational realities. This triangulated analytical approach allowed policy conclusions to be based on converging evidence rather than any single programme indicator.

Ethical Considerations

The analysis used aggregated routine programme monitoring data generated during April 2025 National Immunization Plus Days. No individual-level records, names, addresses or personally identifiable health information were accessed or analysed. The authors accessed the programme information under administrative authorization linked to official public health programme responsibilities. The use of the aggregated figures and indicators in this manuscript was undertaken in accordance with applicable programme reporting procedures. Because the work involved secondary analysis of routinely collected, aggregated programme data for policy evaluation, it did not constitute direct human participant research requiring formal institutional ethical review.

Study Limitations

Several limitations should be considered when interpreting these findings. First, the analysis relied on routinely collected programme monitoring data generated for operational purposes rather than primary research, making it subject to the inherent limitations of administrative reporting systems. Second, the study represents a cross-sectional assessment of surveillance performance during the April 2025 NIPDs and therefore does not evaluate longitudinal trends or establish causal relationships. Third, programme indicators such as geo-verification and LQAS provide complementary but distinct measures of campaign implementation and should not be interpreted as direct measures of vaccination coverage or surveillance sensitivity in isolation. Finally, where programme reports were not independently validated outside routine monitoring systems, interpretation should acknowledge the possibility of reporting variability and operational heterogeneity across states and LGAs. Nevertheless, triangulation of multiple programme data sources with established WHO and GPEI surveillance guidance and contemporary peer-reviewed evidence provides a robust basis for identifying policy-relevant surveillance gaps and informing recommendations for strengthening Nigeria's AFP surveillance system.

Beyond the Numbers: Interpreting Surveillance Data for Policy Action

The April 2025 National Immunization Plus Days (NIPDs) provide an important opportunity to examine the strengths and limitations of Nigeria's acute flaccid paralysis (AFP) surveillance system beyond routine national performance indicators. Although the campaign demonstrated substantial progress in programme coordination and implementation, the available evidence suggests that favourable national statistics should be interpreted alongside operational and geographic indicators to obtain a more comprehensive understanding of surveillance performance (NPHCDA, 2025a). Consistent with the analytical framework adopted in this study, the findings are interpreted by distinguishing campaign implementation, surveillance sensitivity, and outbreak detection, each of which reflects a different dimension of programme performance.

One of the clearest operational findings relates to geographic reach. During the April 2025 campaign, only 71% of targeted settlements were successfully geo-verified (Figure 1), indicating that nearly three out of every ten planned settlements lacked documented geographic verification (NPHCDA, 2025a). As discussed in the Methods section, geo-verification is an implementation monitoring tool rather than a direct measure of vaccination coverage or AFP surveillance sensitivity. Nevertheless, incomplete geographic verification introduces uncertainty regarding whether all targeted settlements were reached during campaign implementation. Without comprehensive geo-tagging and spatial validation, programme managers have limited ability to independently verify field activities, assess geographic equity, or identify settlements requiring additional follow-up.

Consequently, incomplete geo-verification may reduce confidence in reported implementation reach and complicate efforts to ensure that underserved populations are consistently included in surveillance and immunization activities (Raimi, 2025a-e; Vivian & Morufu, 2026). Campaign quality monitoring using Lot Quality Assurance Sampling (LQAS) presents a similarly nuanced picture. Programme reports indicated that 88% of Local Government Areas (LGAs) achieved the operational threshold of ≥90% campaign quality during the April 2025 NIPDs (Figure 2) (NPHCDA, 2025b). While this finding is encouraging, LQAS is designed primarily as a rapid classification tool for programme monitoring rather than a precise estimator of vaccination coverage

(Brown *et al.,* 2014; Greenland *et al.,* 2011). Consequently, LQAS classifications should be interpreted alongside complementary sources of evidence, including geo-verification results, operational observations, and AFP surveillance indicators. An LGA meeting the LQAS decision threshold may still experience challenges related to supervisory quality, community engagement, or identification of missed children and AFP cases.

Accordingly, campaign quality, surveillance sensitivity, and operational performance should not be considered interchangeable measures of programme success. Operational monitoring data further illustrate how implementation challenges may influence surveillance effectiveness. As summarized in Table 1, the April 2025 NIPDs encountered delays in data collation, inconsistencies in field team performance, and weaknesses in supervisory oversight and accountability (NPHCDA, 2025b). Although these operational constraints do not necessarily indicate poor vaccination coverage, they may reduce the timeliness, completeness, and reliability of surveillance information by delaying reporting, limiting supervision, and weakening feedback mechanisms. These findings emphasize that effective outbreak preparedness depends not only on achieving coverage targets but also on maintaining high-quality operational systems capable of identifying, investigating, and responding rapidly to suspected AFP cases.

National AFP surveillance indicators continue to demonstrate strong overall programme performance. The reported non-polio AFP (NP-AFP) rate of 11.9 substantially exceeds the WHO minimum performance standard of ≥2 cases per 100,000 children younger than 15 years, indicating high national surveillance sensitivity (WHO, 2021). Similarly, the national stool adequacy rate of 99% reflects effective specimen collection and coordination between surveillance personnel and laboratory services. Nevertheless, interpretation of these aggregate indicators requires caution. National averages may conceal important geographic variation, particularly in conflict-affected, remote, or underserved LGAs where surveillance infrastructure, logistics, and cold-chain capacity remain comparatively weaker (GPEI, 2023). Consequently, strong national performance should not preclude continued assessment of subnational surveillance equity. The reported non-polio enterovirus (NPENT) detection rate of 12.1% likewise exceeds the internationally recommended benchmark of 10%, providing additional evidence of acceptable specimen quality and laboratory performance (WHO, 2021). However, as with other surveillance indicators, national NPENT performance cannot fully characterize surveillance quality across all geographic areas. Regions with limited community informant networks, difficult physical access, or inconsistent reporting may continue to experience reduced surveillance sensitivity despite favourable national averages. These findings reinforce the importance of interpreting surveillance indicators at both national and subnational levels to identify geographic inequities requiring targeted intervention. Perhaps the most policy-relevant finding is the observed reduction in the number of states reporting poliovirus detections, from 15 during previous programme periods to 9 during the April 2025 campaign, representing an approximate 47% decline (NPHCDA, 2025a). This observation should be interpreted cautiously. A reduction in reported detections may reflect genuine reductions in virus circulation, improvements in outbreak control, or changing epidemiological dynamics.

Equally, however, it may indicate geographic differences in surveillance sensitivity, operational performance, specimen collection, or reporting completeness. When considered alongside incomplete geo-verification, documented implementation challenges, and the continued occurrence of orphan poliovirus isolates discussed earlier, the findings suggest that surveillance performance should be evaluated using multiple complementary indicators rather than relying on reported case counts alone. Collectively, the evidence presented in Figures 1 and 2, Table 1, and the national AFP surveillance indicators illustrates a dual reality. Nigeria continues to demonstrate strong national surveillance performance according to internationally recognized indicators while simultaneously facing operational and geographic disparities that may limit surveillance effectiveness in specific settings. These findings underscore the importance of moving beyond aggregated national statistics toward more granular assessments that integrate implementation quality, geographic verification, surveillance sensitivity, and operational readiness. Such an evidence-based and

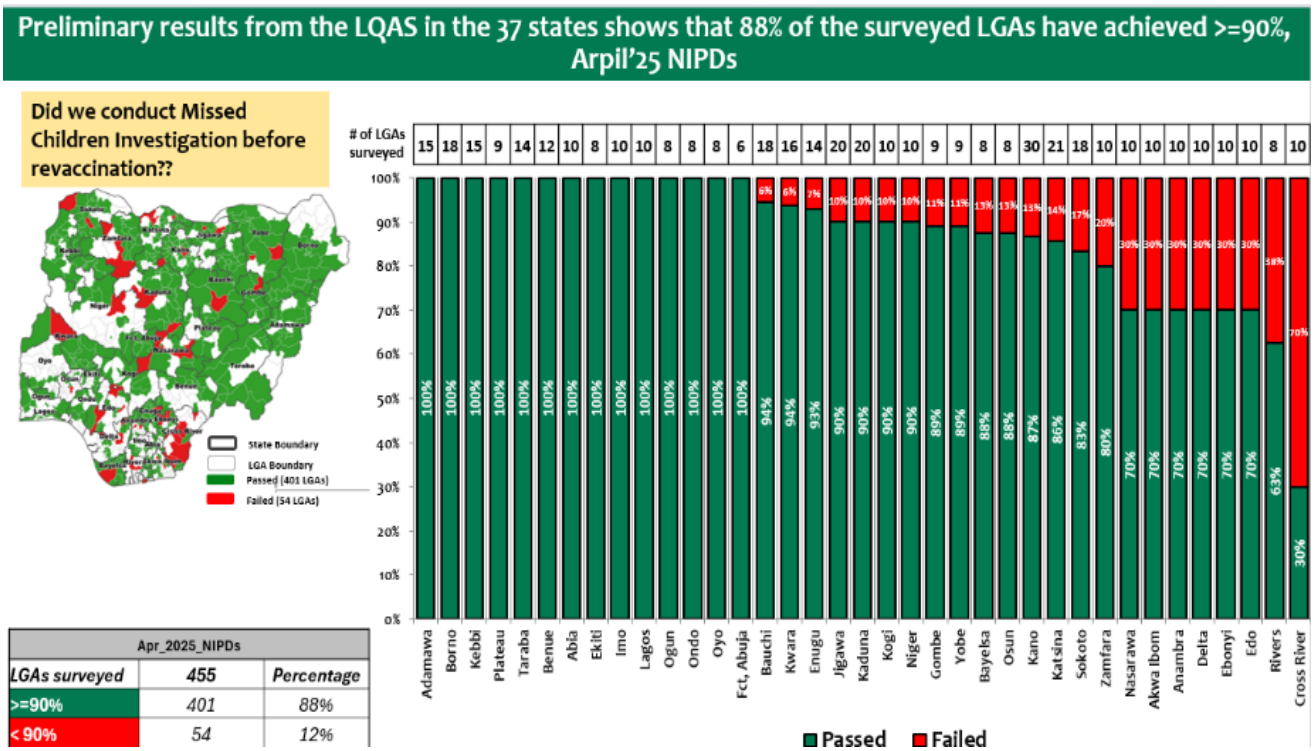

Figure 2: Preliminary Results from LQAs in the 37 states show that 88% of the surveyed LGAs have achieved >=90%, April 25 NIPDs
Source: Team Analysis

equity-oriented approach provides a stronger foundation for policy decisions aimed at strengthening surveillance, improving outbreak preparedness, and sustaining Nigeria's progress toward long-term poliovirus eradication.

Strategic Policy Actions to Close Surveillance Gaps

To sustain Nigeria's polio-free status and prevent further outbreaks of circulating vaccine-derived poliovirus type 2 (cVDPV2), evidence-based policy interventions must target the surveillance weaknesses identified in recent campaigns. Data from the April 2025 National Immunization Plus Days (NIPDs) highlight operational and geographic gaps, including incomplete settlement coverage (Figure 1), inconsistencies in LQAS results (Figure 2), and systemic bottlenecks in campaign execution (Table 1). Addressing these gaps requires coordinated systemic reforms coupled with localized interventions that strengthen both implementation quality and field-level accountability.

Independent Surveillance Audits

Independent, third-party surveillance audits should be conducted across low-performing or silent LGAs. These audits would provide an objective assessment of AFP case detection, verify campaign reach, and evaluate the functionality of local surveillance infrastructure (Raimi and Raimi, 2020; Yusuf *et al.,* 2025). Geo-tagged and timestamped reporting should be integrated into these audits to ensure spatial accountability and allow verification of whether field officers reached targeted settlements within appropriate timelines. This approach directly responds to the gaps identified in Figure 1, where nearly 30% of settlements lacked verifiable coverage, and addresses potential underreporting or misrepresentation of performance metrics.

Geo-enabled Surveillance

To improve precision in outbreak detection and operational monitoring, AFP case reporting must be fully geo-enabled. Each suspected or confirmed case should be geolocated at the point of detection, and reporting and investigation timelines digitally logged. Geo-mapping strengthens the verification of campaign reach, enhances the timeliness of response activities, and allows supervisors to rapidly identify unvisited settlements (Raimi *et al.,* 2020; Elemuwa *et al.,* 2024b; Promise *et al.,* 2024). Integrating geo-data into national dashboards ensures real-time monitoring and creates a verifiable record of field performance, directly

addressing the geographic blind spots documented in Figure 1.

Community Informant Networks

Effective AFP surveillance depends on embedding detection mechanisms within communities. Health professionals alone cannot identify all cases promptly; trusted intermediaries, such as teachers, religious leaders, traditional birth attendants, and town criers, play a critical role in early case identification. Strengthening and formalizing community informant networks ensures broader surveillance coverage, especially in rural or conflict-affected LGAs (Uchenna *et al.,* 2024; Abaya *et al.,* 2024; Elemuwa *et al.,* 2024a).

Informants should receive standardized training and be equipped with mobile-based reporting tools, including SMS alerts, simplified case-reporting applications, and two-way communication platforms that provide updates, reminders, and feedback. Data collected through these channels should feed into centralized national dashboards for monitoring, verification, and rapid response (Babbo *et al.,* 2025; Kakwi *et al.,* 2025; Adaka *et al.,* 2026; Promise *et al.,* 2026; Tinimoye *et al.,* 2026).

Accountability Metrics and Performance Incentives

National and subnational health systems must establish and enforce key performance indicators to monitor surveillance quality. Metrics should include timeliness of detection, interval between case reporting and investigation, and speed of laboratory confirmation and feedback. Linking these indicators to performance-based incentives can encourage timely detection and accurate reporting, while persistent underperformance or falsification should trigger corrective measures, including retraining, reassignment, or other administrative actions (Raimi and Raimi, 2020; Raimi *et al.,* 2021c; Okechukwu *et al.,* 2024; Uchenna *et al.,* 2024; Elemuwa *et al.,* 2024b; Henry and Morufu, 2025; Olaniyi and Morufu, 2025; Yusuf *et al.,* 2025). This approach directly addresses the operational deficiencies highlighted in Table 1 and reinforces a culture of accountability across LGAs and states.

Strengthening Lot Quality Assurance Sampling (LQAS) and Data Transparency

The findings presented in Figure 2 indicate that 88% of Local Government Areas (LGAs) achieved the operational threshold of ≥90% campaign quality during the April 2025 National Immunization Plus Days (NIPDs). While encouraging, these results should be interpreted within the methodological context of Lot Quality Assurance Sampling (LQAS), which is designed to classify programme performance rather than provide precise estimates of vaccination coverage (Brown *et al.,* 2014; Greenland *et al.,* 2011).

Consequently, LQAS findings should be complemented by additional sources of evidence, including geo-verification data, operational monitoring, and AFP surveillance indicators, to provide a more comprehensive assessment of programme quality. To strengthen confidence in LQAS findings, independent validation mechanisms should be incorporated into future campaign monitoring. External supervisors, unannounced spot checks, and periodic data quality assessments can improve the credibility of reported classifications while reducing the risk of reporting bias. Furthermore, greater transparency through disaggregated reporting at ward and LGA levels would enable programme managers, researchers, civil society organizations, and community leaders to identify localized performance gaps and support evidence-based corrective actions. Such an approach reinforces public confidence in programme monitoring while improving accountability for campaign implementation.

Operational Reforms to Improve Campaign Performance

The operational constraints summarized in Table 1 demonstrate that surveillance performance depends not only on technical indicators but also on the effectiveness of programme implementation. Delays in data collation, inconsistent supervision, fragmented reporting structures, and weak leadership accountability reduce the responsiveness of surveillance systems and may delay outbreak detection and response (Uchenna *et al.,* 2024; Abaya *et al.,* 2024; Christopher *et al.,* 2024; Ibrahim *et al.,* 2025; NPHCDA, 2025). Addressing these challenges requires systematic operational reforms. Routine post-campaign operational reviews should be institutionalized,

particularly in LGAs demonstrating persistent implementation challenges or recurrent surveillance gaps. These reviews should examine supervisory practices, logistics management, reporting workflows, workforce deployment, and community engagement strategies to identify recurring constraints and guide continuous quality improvement. Supervisory structures should also be strengthened through a layered oversight model in which state-level supervisors monitor real-time programme performance, provide rapid technical support to LGA teams, and verify corrective actions where implementation anomalies are identified. Regular end-of-day performance reviews involving local government authorities, health managers, and community representatives would further strengthen accountability, improve coordination, and facilitate timely resolution of operational barriers before they compromise surveillance effectiveness.

Developing a Digital Surveillance Architecture

Strengthening surveillance requires modern information systems capable of supporting timely decision-making. The operational delays identified during the April 2025 campaign demonstrate the need for an integrated digital surveillance architecture that enables rapid reporting, verification, analysis, and feedback. Mobile-enabled reporting platforms should be deployed across surveillance teams to facilitate real-time submission of AFP notifications, supervisory observations, and campaign monitoring data. In areas with limited network connectivity, offline data capture with automated synchronization should be incorporated to ensure continuity of reporting. Cloud-based surveillance dashboards integrating geo-verification, laboratory reporting, LQAS classifications, and AFP surveillance indicators would provide programme managers with a comprehensive operational picture, allowing rapid identification of surveillance gaps and timely deployment of corrective interventions.

Importantly, digital transformation should be accompanied by sustained investments in workforce training, data governance, cybersecurity, and routine system maintenance to ensure that technological innovations translate into measurable improvements in surveillance quality rather than creating additional operational complexity.

Establishing a National Surveillance Strengthening Strategy

The surveillance challenges identified in this analysis underscore the need for a coordinated national strategy that extends beyond individual immunization campaigns. Rather than implementing isolated corrective measures, Nigeria should adopt a comprehensive surveillance strengthening framework that integrates policy development, operational improvement, workforce capacity building, digital innovation, and community engagement within a single strategic programme. Such a framework should establish measurable national performance targets, annual surveillance scorecards, independent programme evaluations, stakeholder review meetings, and structured community feedback mechanisms. Integration with broader health system strengthening initiatives, including routine immunization, Integrated Disease Surveillance and Response (IDSR), laboratory networks, emergency preparedness, and primary healthcare reforms, would improve efficiency, enhance sustainability, and maximize the public health benefits of surveillance investments (Ogar *et al.,* 2026; Akabueze & Raimi, 2026; Ezekiel & Raimi, 2026). Sustainable financing will be equally important. Long-term improvements in surveillance capacity require predictable domestic investment alongside continued collaboration with national and international partners. Embedding surveillance strengthening within national health planning and budgeting processes will help ensure continuity beyond emergency outbreak responses and donor-supported campaigns.

Policy Synthesis

The evidence presented throughout this analysis demonstrates that Nigeria's surveillance system has achieved substantial progress in meeting internationally recognized performance indicators while continuing to face important geographic, operational, and implementation challenges. The incomplete geographic verification documented in Figure 1, the methodological considerations surrounding LQAS findings in Figure 2, and the operational constraints summarized in Table 1 collectively suggest that surveillance performance cannot be evaluated using aggregated national indicators alone. Accordingly, future policy should prioritize surveillance quality alongside surveillance coverage by strengthening

independent verification, expanding community-based reporting, improving operational accountability, modernizing digital surveillance infrastructure, and institutionalizing continuous programme evaluation. These complementary reforms will improve the sensitivity, equity, and resilience of Nigeria's AFP surveillance system while supporting more rapid outbreak detection and response. Ultimately, sustaining Nigeria's polio-free status requires surveillance systems that are not only technically robust but also geographically inclusive, operationally responsive, and trusted by the communities they serve. By aligning surveillance policy with evidence generated from programme implementation, Nigeria can strengthen its capacity to detect poliovirus transmission early, respond rapidly to emerging threats, and reinforce broader national health security in an increasingly complex public health environment (Raimi and Raimi, 2020; Raimi *et al.,* 2021c; Okechukwu *et al.,* 2024; Uchenna *et al.,* 2024; Elemuwa *et al.,* 2024b; Henry and Morufu, 2025; Olaniyi and Morufu, 2025; Yusuf *et al.,* 2025).

Anticipated Outcomes of Strategic Surveillance Strengthening

Implementation of the proposed surveillance reforms is expected to generate substantial improvements in the performance, responsiveness, and resilience of Nigeria's acute flaccid paralysis (AFP) surveillance system. Collectively, the policy actions outlined in the preceding section, including independent surveillance audits, geo-enabled reporting, strengthened community-based surveillance, enhanced accountability mechanisms, improved LQAS quality assurance, and digital surveillance integration, provide a complementary framework for addressing the operational and geographic weaknesses identified throughout this analysis. Although the magnitude of these improvements will depend on sustained implementation, adequate financing, and continued political commitment, the proposed reforms are expected to strengthen both poliovirus surveillance and broader epidemic preparedness. One anticipated outcome is improved surveillance sensitivity and more equitable geographic coverage. Strengthening geo-enabled surveillance, expanding community informant networks, and improving field supervision are expected to increase the likelihood that suspected AFP cases are identified, investigated, and reported promptly, particularly in underserved, remote, and security-compromised communities. Enhanced geographic verification would also improve confidence that surveillance activities are reaching previously underrepresented settlements while providing programme managers with more accurate information for targeting corrective interventions.

Collectively, these measures are expected to strengthen Nigeria's early warning capacity for poliovirus transmission and improve the overall completeness of surveillance activities. Improved surveillance sensitivity should also contribute to a reduction in the occurrence of orphan poliovirus isolates, which remain important molecular indicators of undetected transmission. Earlier identification of AFP cases, combined with strengthened community reporting, independent verification, and improved operational oversight, is expected to reduce surveillance blind spots and facilitate more complete documentation of transmission chains. A decline in orphan virus detection would therefore provide indirect evidence of improved surveillance completeness and more effective interruption of previously unrecognized poliovirus circulation.

The recommended reforms are also expected to improve the timeliness of outbreak detection and response. Integrating real-time digital reporting with geo-referenced surveillance systems would enable more rapid notification of suspected AFP cases, accelerate epidemiological investigations, and facilitate earlier deployment of outbreak response teams. Improved timeliness would strengthen contact tracing, targeted immunization activities, and laboratory confirmation processes while reducing opportunities for continued virus transmission. By shortening the interval between case detection and public health action, these reforms could substantially enhance Nigeria's capacity to contain localized outbreaks before they expand geographically. An additional anticipated outcome is stronger community trust and more meaningful public participation in surveillance activities. Community engagement remains fundamental to effective disease surveillance, particularly in settings where formal health services have limited reach. Greater involvement of teachers, religious leaders, traditional birth attendants, community volunteers, and other

trusted local actors is expected to improve community awareness, encourage earlier reporting of suspected AFP cases, and strengthen acceptance of immunization activities (Raimi *et al.,* 2019b; Raimi and Raimi, 2020; Raimi *et al.,* 2021c; Elemuwa *et al.,* 2024; Elemuwa *et al.,* 2024b; Mordecai *et al.,* 2024; Okechukwu *et al.,* 2024). Enhanced community participation may also contribute to improved programme transparency, reduced vaccine hesitancy, and stronger collaboration between health authorities and local populations (Morufu *et al.,* 2021b; Morufu *et al.,* 2021c; Raimi *et al.,* 2021a; Raimi *et al.,* 2021c). These social dimensions are increasingly recognized as essential components of sustainable surveillance systems rather than secondary programme benefits (Elemuwa *et al.,* 2024a; Elemuwa *et al.,* 2024b; Oweibia *et al.,* 2024; Mordecai *et al.,* 2024).

Beyond poliovirus eradication, strengthening AFP surveillance is expected to generate broader benefits for national health security. Surveillance systems capable of rapidly detecting and responding to AFP cases provide important infrastructure for monitoring and controlling other epidemic-prone diseases, including measles, cholera, Lassa fever, and emerging infectious threats. Investments in community reporting, laboratory coordination, digital information systems, workforce capacity, and data governance are therefore likely to produce benefits extending beyond the polio programme by strengthening the overall resilience of Nigeria's public health surveillance system. Taken together, these anticipated outcomes extend beyond improvements in surveillance indicators alone. They represent progress toward a surveillance system that is more equitable, responsive, transparent, and accountable. If implemented consistently and supported through sustained financing, intersectoral collaboration, and continuous programme evaluation, the proposed reforms are expected to strengthen Nigeria's capacity to sustain its polio-free status, improve preparedness for future public health emergencies, and reinforce its contribution to regional and global health security. While continued monitoring and independent evaluation will be essential to assess the effectiveness of these interventions, the evidence presented in this analysis provides a strong policy rationale for prioritizing surveillance strengthening as a cornerstone of long-term health system resilience.

Implications for Policy and Interventions

The analysis of the April 2025 NIPDs surveillance data, including Figures 1, 2, and Table 1, provides clear evidence to guide Nigeria's future policy and immunization strategy. The incomplete geographic coverage shown in Figure 1, with only 71% of identified settlements geo-referenced, highlights the need to institutionalize digital mapping and spatial verification in campaign planning. Without reliable geospatial data, national coverage claims are inherently uncertain. Policies should mandate the use of GPS-enabled devices, real-time dashboards, and automated geo-verification to ensure that all settlements are reached and documented during immunization rounds (Raimi *et al.,* 2020; Elemuwa *et al.,* 2024; 2024b; Promise *et al.,* 2024). While Figure 2 indicates that 88% of LGAs met the ≥90% LQAS threshold, this metric alone may obscure variations in surveillance sensitivity and community engagement at the ward level. To enhance the utility of LQAS as a quality assurance tool, interventions should include independent validation, random spot checks, involvement of community observers, and disaggregated reporting by ward. Transparent reporting and public accessibility of LQAS results will reinforce accountability and ensure that performance metrics reflect actual field realities (Brown *et al.,* 2014; Greenland *et al.,* 2011; NPHCDA, 2025b; Uchenna *et al.,* 2024). Table 1 identifies structural and operational bottlenecks, including weak field supervision, delayed data transmission, and absence of real-time feedback mechanisms. Addressing these vulnerabilities requires standardization of supervisory protocols, routine mentorship, and digital performance dashboards accessible at all levels of government (Raimi *et al.,* 2019b; Raimi and Raimi, 2020; Elemuwa *et al.,* 2024a; Elemuwa *et al.,* 2024b; Okechukwu *et al.,* 2024). These operational reforms are essential for timely outbreak detection, accurate reporting, and effective response coordination. The findings further underscore the importance of multi-level coordination. Surveillance failures often reflect misalignment between national strategy and local implementation. Adaptive policies should allow state-specific operational models while maintaining clear federal standards. Community

surveillance networks, intersectoral health taskforces, and local accountability frameworks can bridge this gap. Incentive structures for LGAs demonstrating excellence in reporting, supervision, and rapid response will promote innovation and reinforce best practices (Morufu *et al.,* 2021a; Raimi *et al.,* 2021a; Elemuwa *et al.,* 2024b). Taken together, these insights support reconceptualizing surveillance as a frontline service rather than a back-end technical task. Embedding geo-verification, ensuring high-quality LQAS monitoring, and resolving operational inefficiencies will transform surveillance into a responsive, community-owned system. Such an approach strengthens Nigeria's polio-free certification and enhances broader public health security by improving early detection, outbreak containment, and equitable access to surveillance coverage (Raimi *et al.,* 2021c; Mordecai *et al.,* 2024; Henry and Morufu, 2025; Olaniyi and Morufu, 2025; Yusuf *et al.,* 2025). These interventions are critical, not optional, for sustaining disease control and building resilient surveillance infrastructure capable of supporting future epidemic preparedness.

CONCLUSION

The evidence presented in this policy analysis demonstrates that Nigeria's acute flaccid paralysis (AFP) surveillance system continues to perform well against several internationally recognized indicators while facing important operational and geographic challenges that may compromise surveillance effectiveness in specific settings. Analysis of the April 2025 National Immunization Plus Days (NIPDs) highlights a complex picture in which strong national surveillance metrics coexist with persistent subnational disparities in geographic verification, campaign implementation, and operational performance. Three principal findings emerge from the analysis. First, the geo-verification results presented in Figure 1 indicate that only 71% of targeted settlements had documented geographic verification during the April 2025 campaign, suggesting incomplete evidence of programme reach in a substantial proportion of settlements. Although geo-verification is not a direct measure of vaccination coverage or surveillance sensitivity, incomplete geographic documentation limits confidence in implementation reach and highlights the need for stronger spatial monitoring systems. Second, while Figure 2 indicates that 88% of Local Government Areas (LGAs) achieved the operational Lot Quality Assurance Sampling (LQAS) threshold, these classifications should be interpreted alongside geo-verification findings, AFP surveillance indicators, and operational monitoring results rather than as standalone measures of programme performance. Third, the operational constraints summarized in Table 1, including inconsistent supervision, delays in reporting, fragmented data management, and limited feedback mechanisms, demonstrate that programme implementation remains an important determinant of surveillance quality and outbreak preparedness. The analysis further suggests that favourable national surveillance indicators, including the reported non-polio AFP rate of 11.9, stool adequacy of 99%, and non-polio enterovirus (NPENT) detection rate of 12.1%, should be interpreted alongside subnational evidence to ensure that national averages do not obscure geographic inequities in surveillance performance.

Similarly, the observed reduction in the number of states reporting poliovirus detections and the continued occurrence of orphan poliovirus isolates reinforce the importance of strengthening surveillance sensitivity, operational verification, and community-based reporting, particularly in underserved and hard-to-reach areas. Collectively, these findings indicate that sustaining Nigeria's polio-free status requires a transition from campaign-centred surveillance toward an integrated surveillance system that is geographically inclusive, operationally accountable, digitally enabled, and community-centred. The policy actions proposed in this analysis, including independent surveillance audits, geo-enabled verification, strengthened community informant networks, enhanced operational accountability, improved LQAS quality assurance, and integrated digital surveillance systems, provide complementary strategies for addressing the weaknesses identified in Figures 1 and 2 and Table 1. Successful implementation of these reforms will require sustained political commitment, predictable financing, workforce development, and continued collaboration among government agencies, communities, academic institutions, and development partners. Beyond poliovirus eradication, strengthening AFP surveillance represents an investment in Nigeria's broader health

security infrastructure. Improvements in surveillance quality, laboratory coordination, digital reporting, and community engagement will enhance the country's capacity to detect, investigate, and respond rapidly to a wide range of epidemic-prone diseases. Consequently, surveillance strengthening should be viewed not solely as a disease-specific intervention but as a core component of resilient health systems and national emergency preparedness. In conclusion, the findings presented in this study support a shift from evaluating surveillance success primarily through aggregated national indicators toward a more comprehensive assessment that incorporates geographic equity, operational quality, community engagement, and implementation performance. Such an approach will strengthen the credibility, responsiveness, and sustainability of Nigeria's surveillance system while supporting continued progress toward the long-term goal of poliovirus eradication and improved public health security.

Health Significance

The findings of this policy analysis underscore the central role of high-quality surveillance in protecting population health and sustaining progress toward poliovirus eradication in Nigeria. Effective surveillance extends beyond measuring programme performance; it provides the foundation for timely outbreak detection, evidence-based decision-making, and equitable delivery of immunization services. The geographic and operational gaps identified during the April 2025 National Immunization Plus Days (NIPDs) demonstrate that surveillance quality remains a critical determinant of whether vulnerable populations are reached and whether emerging poliovirus transmission is detected before widespread dissemination. Incomplete geographic verification, delayed reporting, and operational weaknesses reduce the ability of surveillance systems to identify acute flaccid paralysis (AFP) cases promptly and initiate timely public health responses. Strengthening surveillance, therefore, has important implications not only for maintaining Nigeria's polio-free status but also for improving the effectiveness of routine immunization programmes and outbreak response activities.

Investments in geo-enabled verification, community-based surveillance, digital reporting systems, and operational quality improvement can enhance the sensitivity, timeliness, and equity of disease detection, particularly in underserved and hard-to-reach communities. The analysis also highlights the importance of community engagement as a core component of surveillance effectiveness. Surveillance systems function most effectively when communities actively participate in reporting suspected cases, supporting immunization activities, and maintaining confidence in public health interventions. Strengthening partnerships with community leaders, teachers, religious organizations, and other trusted local actors can improve early case detection while reinforcing public trust in health programmes. Such trust is essential for sustaining high immunization uptake, countering misinformation, and supporting rapid implementation of outbreak response measures.

Beyond poliovirus eradication, the surveillance capacities examined in this study are directly relevant to Nigeria's broader health security agenda. Surveillance systems capable of rapidly detecting, investigating, and responding to AFP cases also strengthen preparedness for other epidemic-prone diseases, including measles, cholera, Lassa fever, yellow fever, and emerging infectious threats. Consequently, investments in surveillance infrastructure, workforce capacity, laboratory coordination, and data systems represent strategic investments in national health system resilience rather than disease-specific interventions alone. Overall, this analysis demonstrates that strengthening surveillance is both a public health priority and a strategic investment in sustainable health system performance. By improving surveillance quality, geographic equity, operational accountability, and community engagement, Nigeria will be better positioned to sustain its polio-free status while enhancing preparedness for future public health emergencies. These findings reinforce the importance of embedding surveillance strengthening within broader health system reforms to support long-term population health, national health security, and progress toward universal health coverage as represented graphically below (Figure 3):

Figure 3: Health Significance of Strengthened Disease Surveillance in Nigeria - Pathways to Improved Population Health and System Resilience.
Note: Figure 3 is a conceptual synthesis figure developed by the authors to summarize the anticipated health significance of strengthened disease surveillance. It is not an empirical result and should be interpreted as a visual policy framework linking surveillance strengthening to improved outbreak detection, geographic equity, community trust, health-system resilience and population-health outcomes.

DECLARATIONS

Ethics Approval and Consent to Participate

This study was based exclusively on secondary analysis of routinely collected programme monitoring data generated during the April 2025 National Immunization Plus Days (NIPDs). No human participants were recruited, interviewed, or directly involved in the study, and no identifiable personal information was accessed or analyzed. Consequently, the study did not constitute human subjects research requiring formal institutional ethical review. The analysis was undertaken in accordance with applicable national programme guidance and principles for the responsible use of routinely collected public health data.

Consent for Publication

Not applicable.

Data Availability

The data supporting the findings of this study comprise routinely collected programme monitoring data from the April 2025 National

Immunization Plus Days (NIPDs) implemented by the National Primary Health Care Development Agency (NPHCDA), Nigeria. Access to these programme data was obtained through administrative authorization in accordance with official programme procedures. The datasets are not fully available in the public domain as stand-alone research datasets but may be made available by the corresponding author upon reasonable request, subject to applicable NPHCDA data-sharing policies and administrative requirements.

Administrative Authorization and Permission to Use Programme Data

The programme data and operational figures analyzed in this study were accessed under administrative authorization through the authors' official public health responsibilities. The corresponding author, serving in a senior programme management role within the Bayelsa State Primary Health Care Board, had legitimate programme access to the routinely collected monitoring data used in this analysis. Permission to analyze and report aggregated programme findings was obtained in accordance with established programme reporting procedures. All figures, tables, and programme indicators presented in this manuscript are derived from authorized NPHCDA programme monitoring data, with no modification of the original surveillance records beyond analytical interpretation for policy purposes.

Author Contributions

All authors contributed equally to conceptualization, validation, writing review and editing.

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Competing Interests

Authors declare that they have no competing interests.

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Disclaimer

The interpretations, analyses, and policy recommendations presented in this manuscript are those of the authors and should not necessarily be interpreted as representing the official policies, positions, or views of the National Primary Health Care Development Agency (NPHCDA), the Bayelsa State Primary Health Care Board, or any affiliated governmental institution.

List of Abbreviations

Abbreviation	Full Meaning
AFP	Acute Flaccid Paralysis
ACSM	Advocacy, Communication, and Social Mobilization
cVDPV2	Circulating Vaccine-Derived Poliovirus Type 2
EPI	Expanded Programme on Immunization
GPEI	Global Polio Eradication Initiative
GTS	Geo-Tracking System
HRH	Human Resources for Health
LGA	Local Government Area
LQAS	Lot Quality Assurance Sampling
MLOS	Micro-Listing of Settlements
NCDC	Nigeria Centre for Disease Control
NIPDs	National Immunization Plus Days
NP-AFP	Non-Polio Acute Flaccid Paralysis
NPENT	Non-Polio Enterovirus
NPHCDA	National Primary Health Care Development Agency
OBR5	Outbreak Response Round 5
PHC	Primary Health Care
RI	Routine Immunization
SDGs	Sustainable Development Goals
WHO	World Health Organization

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