Policy Brief:

Strengthening Routine Immunization in Nigeria through Digital Innovation

Addressing Zero-Dose and Under-Immunization with the Automated Digitalized Immunization System (ADIS)

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For:

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Executive Summary

This policy brief presents a strategic framework to address the persistent challenges of low immunization uptake, high zero-dose prevalence, and under-immunization among children in Nigeria. It draws on the successful implementation of the Automated Digitalized Immunisation System (ADIS) pilot in Ilorin East LGA, Kwara State—an innovative, AI-ready digital platform developed by the Equitable Health Access Initiative (EHAI) with support from the Pfizer Foundation's Global Health Innovation Grant (GHIG). Aligned with the WHO's Digital Adaptation Kit (DAK) for Immunization and the Person-Centred Point-of-Service System (PCPOSS), ADIS enables healthcare workers to access, record, and update individual health information at the point of care, thereby enhancing service delivery, data accuracy, and continuity of care. The pilot demonstrated a scalable model for improving vaccination coverage, strengthening data systems, and reaching underserved populations, offering a compelling case for national adoption and integration into Nigeria's routine immunization infrastructure.

Background and Problem Statement

Despite significant progress in Nigeria's immunization program, the country continues to face persistent challenges with zero-dose children (those who have never received any vaccine) and high rates of under-immunization. It has one of the highest numbers of zero-dose children globally, with vaccine-preventable diseases contributing to a substantial percentage of childhood mortality. These challenges are multifaceted and include:

- Reliance on manual paper-based registers, limited follow-up capacity, and fragmented data systems undermines effective planning, caregiver engagement, and service delivery.
- Socio-economic and Cultural Barriers: Factors such as maternal education, access to ante- and perinatal care, and socio-economic status significantly influence vaccine uptake.
- Systemic Deficiencies: Issues like vaccine stockouts, limited accessibility to health facilities, and the high prevalence of home births contribute to under-immunisation and dropout rates.
- Logistical Issues: Inaccurate population estimates and a lack of standardized, real-time data for tracking zero-dose and under-immunized children hinder effective planning and intervention.
- Vaccine Hesitancy: Misinformation and fear of side effects remain a barrier in many communities.

To address these systemic barriers, EHAI, through several co-creation meetings with relevant stakeholders, including the Kwara State Primary Health Care Development Agency, developed and piloted the Automated Digitalized Immunization System (ADIS) with support from the Pfizer Foundation's Global Health Innovation Grant (GHIG-8). ADIS aligns with the WHO Digital Adaptation Kit (DAK) for Immunization, ensuring it meets international best practices for digital health systems. The pilot was conducted between June 2024 and September 2025 across 12 Primary Health Centres (PHCs) and the University of Ilorin Teaching Hospital (UITH) in Ilorin East LGA, Kwara State.

Key Features of ADIS (Pilot Version)

1. **Electronic Immunization Register (EIR):** A digitalized child health card replaced the existing paper-based records with a secure, cloud-based digital database, ensuring data integrity and accessibility
2. **ANC–EIR Linkage:** Pregnant women tracked via digitalized antenatal care (ANC) records; newborns are automatically enrolled into EIR at delivery.
3. **Automated SMS Notifications:** The system automates SMS reminders for caregivers about upcoming immunization appointments. Caregivers receive vaccination reminders 48–24 hours before appointments.
4. **Daily Line-Lists to Health Care Workers:** To reduce the incidence of missed vaccinations, detailed line lists of children with vaccination appointments and line lists of children who default on their appointment are emailed ahead of each session and within 24 hours after the immunization session respectively.
5. **Defaulter Tracking:** Community volunteers receive automated lists of children who have missed their appointments via email within 24 hours, enabling timely follow-up at the community level.

6. **Social & Behavioural Change Communication (SBCC):** The platform delivers scripted SBCC messages to caregivers and community members to promote the importance of vaccination and address vaccine hesitancy.
7. **Reporting Support:** Automated summaries improved accuracy and timeliness of monthly immunization reports by nearly 50%.
8. **Real-time Data and Analytics:** Policymakers and health officials can access a dynamic dashboard that displays key immunisation indicators in real-time, providing critical data for evidence-based decision-making and strategic planning.
9. **Establishment of the State Project Review Team (SPRT):** chaired by KwPHCDA and comprising NPHCDA, WHO, UNICEF, AFENET, and other stakeholders. The SPRT provided strategic oversight, conducted bi-monthly reviews, and offered technical guidance to optimize the ADIS solution, ensure project success and sustainability.
10. **Secure Cloud Platform:** Role-based access control ensures data security and relevance at each user level.
11. **Solar-Powered Devices:** Tablets with solar power packs enabled functionality in low-power rural settings.

Alignment with WHO DAK for Immunization (Eight Components)

1. **Health Interventions & Recommendations:** ADIS supports routine childhood immunization, defaulter tracing, follow-up visits, and newborn enrollment consistent with WHO guidance.
2. **Generic Personas:** Incorporates health workers, community volunteers, caregivers, and policymakers with tailored digital tools for their roles.
3. **User Scenarios:** Real-time immunization sessions, caregiver reminders, and community-level defaulter tracking integrated seamlessly into workflows.
4. **Business Processes & Workflows:** Registration, counselling, ANC-immunization linkage, reporting, and defaulter follow-up digitized for efficiency.
5. **Core Data Elements:** Standardized EIR data mapped to international standards (ICD-11, SNOMED) to ensure interoperability.
6. **Decision-Support Logic:** Automated vaccine scheduling, alerts, and error detection for immunization due dates and contraindications.
7. **Indicators & Performance Metrics:** Real-time dashboards generate WHO-recommended coverage indicators, enabling data-driven policy.
8. **Functional & Non-Functional Requirements (In-view):** Offline capabilities, multi-language support, cloud-based storage, and secure role-based access.

Key Achievements of ADIS

- Digitalized records for 22,000+ children in 183 communities.
- 60% reduction in missed appointments through automated SMS reminders.
- Defaulter tracking success rate of 68%, through timely follow-up of caregivers.
- Dropout rates reduced from 22% to 8% in pilot communities.
- 2,000+ zero-dose children identified and vaccinated, 73% from migrant Fulani communities.
- Nearly 50% increase in accuracy and timeliness of monthly immunization reports.

- 101 healthcare workers, 12 Documentation Associates, and 24 Community Volunteers trained.
- Real-time dashboards and automated line list enhanced microplanning and outreach.
- Improved microplanning at the facility level, including potential for better vaccine stock management.
- Demonstrated seamless ANC-immunization linkages, with newborns automatically enrolled into the Electronic Immunization Register (EIR).

Challenges Identified

- Digital literacy gaps among healthcare workers.
- Internet connectivity issues in rural PHCs.
- Lack of standardized unique identifiers for immunization records.
- Low literacy among caregivers, limiting the effectiveness of SMS reminders.

Lessons Learned

- Early stakeholder engagement fosters government ownership and scale-up readiness.
- Healthcare workers adapt quickly when given structured training and mentoring.
- Community Volunteers are indispensable for identifying defaulters and building trust.
- Technical support and blended digital-human approaches (e.g., Documentation Associates) are critical in low-connectivity settings.
- Standardized unique immunization IDs are urgently needed to integrate fragmented records into a national database.

Planned AI-Driven Upgrade

Building on the success of the pilot, ADIS will be enhanced with AI-driven features to improve efficiency, equity, and scalability:

1. **Predictive Analytics:** AI models to forecast vaccine demand, identify high-risk zero-dose clusters, and guide vaccine stock planning.
2. **Geospatial Mapping:** Real-time mapping of immunization coverage and zero-dose hotspots to optimize outreach strategies.
3. **AI-Powered Chatbots:** Interactive support in multiple local languages to engage caregivers, fathers, and community influencers with tailored health messages.
4. **Interactive Voice Response (IVR) & USSD Codes**: Ensures inclusion of caregivers without smartphones or literacy skills.
5. **Data Quality Assurance:** Automated error detection to reduce duplication and improve consistency of immunization records.
6. **Integration with NHMIS:** Seamless connection to NPHCDA's national data system for harmonized reporting and decision-making.

Policy Recommendations

1. National Scale-Up of Electronic Immunization Registers (EIRs)
    a. Institutionalize EIRs across all PHCs using the ADIS model.
    b. Integrate EIRs with antenatal care and birth registration systems for automatic newborn enrollment.

2. Adopt a Unique Immunization Identifier System: Collaborate with relevant stakeholders to develop and deploy a national unique ID for immunization tracking. This is essential for ensuring accurate, centralized, and interoperable tracking of children's vaccination records across facilities, LGAs and States, thereby eliminating duplication, improving defaulter follow-up, and enabling effective national planning.
3. Strengthen Community Engagement Structures
    a. Formalize the role of Community Volunteers (CVs) in immunization programs
    b. Provide incentives and digital tools to support outreach and defaulter tracking.
    c. Institutionalize digitalized defaulter tracking and zero-dose identification
4. Invest in Digital Infrastructure and Offline Functionality
    a. Equip PHCs with solar-powered devices and offline-capable EIR apps.
    b. Ensure consistent internet access through partnerships with telecom providers.
5. Enhance Capacity Building and Support Systems
    a. Institutionalize regular training and refresher programs for healthcare workers and CVs.
    b. Establish state-level technical support hubs for digital health tools.
6. Support AI Integration: Endorse and support the development of the ADIS AI version upgrade. This will enable a data-driven, proactive approach to public health interventions, moving beyond reactive measures.
7. Leverage AI and Local Languages for Caregiver Engagement: Integrate voice-based reminders and AI-powered translation in local languages to improve caregiver comprehension and response.