

Operational Implementation and Technical Documentation of the Polio Supplementary Immunization Activity (SIA) for Mixed Rural and Peri-Urban Districts.

Under the technical direction of Project Leader Escriva Josemaria, this report documents the comprehensive design, execution, and analytical monitoring of a six-week Supplementary Immunization Activity (SIA) aimed at interrupting poliovirus transmission. The project, structured to function within a low-resource setting characterized by high population density in peri-urban zones and geographic fragmentation in rural areas, serves as an operational blueprint for achieving high-quality immunization coverage. The documentation follows a strict implementation-focused narrative, detailing the technical decisions, logistical flows, and field artifacts generated during the campaign period.

Escriva E. Josemaria



Campaign Scope and Strategy

The eradication of poliomyelitis in high-risk zones requires a departure from static routine immunization (RI) services toward a dynamic, population-based delivery model. This campaign targets 100% of children under five years of age within the designated districts, utilizing a house-to-house strategy to ensure that underserved and mobile populations are not bypassed by traditional health facility-based services. The strategy is anchored in the "Reaching Every District" (RED) framework, which prioritizes the identification of "zero-dose" children—those who have not received the first dose of diphtheria-tetanus-pertussis (DTP1) or any previous polio doses—and "missed communities" where clusters of such children reside.

The project timeframe is strictly partitioned into a six-week cycle: two weeks of intensive microplanning and preparatory logistics, one week of front-line worker (FLW) training and social mobilization, and a three-week implementation and monitoring phase. This period includes the four-day primary rollout and subsequent mop-up activities. The strategic focus shifts from mere administrative coverage to a "quality-first" approach, where the success of the campaign is measured not by the number of vials used, but by the physical verification of finger-marked children in the most inaccessible settlements.

Epidemiological Justification and Risk Profiling

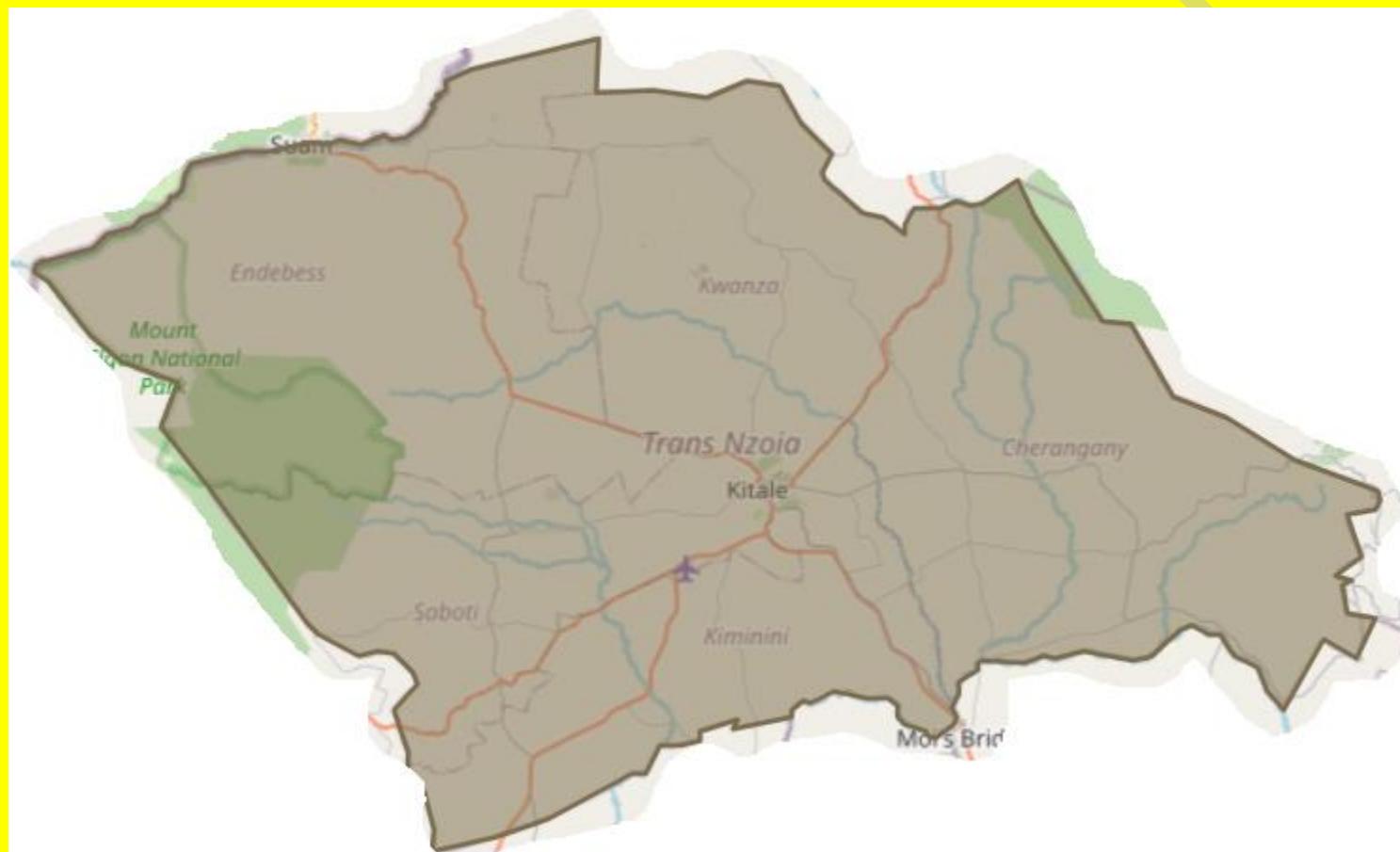
The selection of mixed rural and peri-urban districts is based on historical transmission patterns and the "last mile" challenges identified in recent global eradication strategies. Peri-urban areas often exhibit higher risks due to inward migration, where real population numbers may exceed official census data by 10% to 20%, leading to an accumulation of susceptible children. Rural areas, conversely, present challenges of geographic isolation and limited health infrastructure, necessitating a mobile cold chain and nomadic outreach strategies.

Strategic Implementation Chronogram

Week	Phase	Operational Focus	Lead Responsibility
Week 1	Microplanning	Village enumeration, GIS mapping, and workload rationalization.	Escriva Josemaria / GIS Focal Point
Week 2	Logistics & CCL	Vaccine forecasting, cold chain equipment validation, and buffer stock positioning.	Logistics Coordinator
Week 3	Social Mobilization	Training of FLWs, town crier deployment, and launch of mass media campaign.	SBC/Communication Lead
Week 4	Rollout (Implementation)	House-to-house vaccination, transit point coverage, and daily review meetings.	Field Supervisors
Week 5	Monitoring	Independent monitoring, LQAS assessments, and "mop-up" for missed areas.	M&E Coordinator
Week 6	Evaluation & Transition	Final data consolidation, financial reconciliation, and system strengthening feedback.	Project Leader

Campaign Map and GIS-Enabled Microplanning

Trans-Nzoia County



The foundation of the campaign is a high-resolution microplan developed through a bottom-up process at the health facility level. In low-resource settings, microplanning is the critical intervention that identifies unreached settlements and researches the barriers preventing access to

services. The team utilized a six-step process to ensure plan validity: preparation, fieldwork enumeration, data revalidation, workload rationalization, stakeholder feedback, and continuous updates.

Mapping for this campaign moved beyond simple road maps. The GIS focal point integrated satellite imagery with on-the-ground enumeration to create "Day Area" maps for each vaccination team. These maps clearly demarcate boundaries between health facility catchment areas to prevent "grey zones"—localities that are missed because each health center assumes the other is responsible for them. In rural districts, maps emphasize landmarks, water points, and seasonal nomadic tracks, while peri-urban maps identify informal settlements and high-rise dwellings that require specific access protocols.

Workload Rationalization and Human Resource Deployment

The number of teams required was calculated based on a rational workload assessment: 150 children per day in urban/peri-urban settings, 80-100 in rural areas, and 40-60 in pastoralist or hard-to-reach mountainous zones.

District Type	Settlement Profile	Target <5 Pop	Daily Team Workload	Required Teams	Supervisors (1:5)
Peri-Urban (Alpha)	High Density/Informal	18,000	150	30	6
Rural (Beta)	Dispersed Villages	12,000	100	30	6
Remote (Gamma)	Nomadic/Hard-to-Reach	4,500	50	23	5
Total Project		34,500		83	17

Cold Chain and Logistics System

The potency of the Oral Polio Vaccine (OPV) is entirely dependent on the integrity of the cold chain, a series of storage and transport links designed to maintain a temperature of 0°C to 8°C . In the mixed district setting, the logistics system must manage both large-scale storage at the District Vaccine Store and ultra-portable transport for rural teams.

The project implemented a "Push" logistics system for the forward flow of vaccines and a "Reverse Cold Chain" for stool samples in case of detected Acute Flaccid Paralysis (AFP). A critical failure point identified in previous campaigns was the "reverse logistics gap"—the failure to report balance stocks and return unutilized vials. To mitigate this, every team supervisor is required to conduct a physical vial count at the end of each day, reconciling used, opened, and unopened vials against the morning issue.

Vaccine Requirement and Buffer Logic

The forecasting for this SIA utilized the standard WHO/UNICEF formula:

Buffer stocks were calculated based on previous experience and are held at the district level to respond to unplanned epidemiological needs, such as a localized outbreak or a larger-than-expected nomadic influx.

Cold Chain Equipment Inventory

Equipment Type	Location	Capacity/Protocol	Monitoring Mechanism
Ice-Lined Refrigerator (ILR)	District Store	to (8-hour holdover)	Twice-daily temp logs
Deep Freezer (DF)	District Store	Preparation of ice packs at	Voltage stabilizer check
Cold Box (Large)	Sub-District Hub	Storage for up to 7 days with ice packs	VVM check on arrival
Vaccine Carrier	Team Level	1.7L capacity; 4 conditioned ice packs	Continuous temp monitoring

Field Team Structure and Roles

The field operation is executed by a decentralized structure focused on accountability and quality. Every vaccination team consists of two members: one vaccinator responsible for administering the drops and maintaining the cold chain, and one recorder/mobilizer responsible for marking the child's finger, completing the tally sheet, and managing house markings.

Supervisors serve as the primary quality control mechanism. The supervisor-to-team ratio is maintained at 1:5 in urban areas and 1:3 in rural areas to ensure at least four in-field contacts per team per day. During these contacts, the supervisor validates the tally sheet entries, checks the Vaccine Vial Monitor (VVM) status, and addresses any logistical bottlenecks.

Training and Capacity Building

Project Leader Escriva Josemaria oversaw a comprehensive training program that utilized participatory "Learning by Doing" methods. Training modules covered:

1. **Polio Basics and Surveillance:** Recognizing AFP cases and the importance of fecal sample collection.
2. **Interpersonal Communication (IPC):** Techniques for the "Knock on the Door" to build trust and resolve refusals.
3. **Cold Chain Management:** Proper conditioning of ice packs and VVM interpretation.
4. **Data Integrity:** Accurate tally sheet recording and house marking.

Data Collection and Monitoring System

The campaign generates real-time data to drive adaptive decisions. The primary data source is the daily tally sheet, a physical ledger that documents the age, vaccination status, and location of every child reached. A child is only recorded as vaccinated if they have physically swallowed the drops and received a purple ink mark on their left little finger.

To verify administrative data, the project utilizes Independent Monitoring (IM). Independent monitors, recruited from outside the health system to ensure objectivity, conduct house-to-house and out-of-house (transit point/market) surveys immediately after the vaccination team has passed through an area.

Monitoring Framework and Methodology

Monitoring Type	Timing	Method	Objective
Intra-Campaign	Days 1-4	Rapid Campaign Monitoring (RCM)	Identify missed houses for same-day revisit.
End-Process (IM)	Day 5	Cluster surveys of finger marking	Measure real coverage vs administrative reports.
LQAS	Post-Campaign	Sampling 60 children per "lot" (district)	Determine if a district passed the 90% threshold.
VTS	Real-Time	GIS tracking of team movements	Ensure 100% geographic coverage of settlements.

Coverage Dashboard and Analytical Insights

The project's coverage dashboard integrates three primary metrics: administrative coverage, independent monitoring results, and Lot Quality Assurance Sampling (LQAS) status. The dashboard is updated daily by 8:00 PM to allow the project leadership to prioritize resources for the following day's mop-up activities.

A significant analytical insight from the peri-urban sectors showed a "discordance" between high administrative reporting (98%) and lower independent monitoring results (82%). Investigation revealed that teams were prioritizing households along main roads and missing informal dwellings in the interior of the blocks—a pattern captured by the GIS tracking system. This data triggered a redeployment of supervisors to these "interior" zones during the mop-up phase.

Analytical Indicators and Interpretation

Indicator	Metric	Threshold for Action	Rationale
Fingermark Coverage	% children with ink		Triggers a full-day mop-up in the ward.
Non-Compliance Rate	% caregiver refusals		Triggers deployment of a resolution team.
Settlement Coverage	% settlements visited		Triggers team redeployment via VTS data.
Vaccine Wastage	Doses used / Doses issued		Triggers refresher training on vial management.

Community Engagement and Social Mobilization

The community engagement strategy follows the Social Ecological Model (SEM), which addresses norms and behaviors at the individual, interpersonal, community, organizational, and policy levels. The strategy transitioned from "risk communication" to "social norm communication," framing vaccination as a popular and accepted behavior within the community.

Social mobilizers, often respected local women, are deployed 48 hours before the vaccination teams. They utilize pictorial flipcharts to conduct house-to-house interpersonal counseling, focusing on the safety of the vaccine and the importance of repeated doses. In the rural districts of this campaign, town criers were identified as the most effective channel for reaching isolated hamlets.

Communication Artifacts and Scenarios

Town Crier Script for Village Outreach: "Hear ye, people of [Village Name]! The health workers are coming this Monday. They carry the drops that protect our children from the paralysis of polio. Our chief has already vaccinated his grandchildren. Do not let your child be left behind. Look for the purple mark! It is a mark of health and safety.".

Radio Spot (30 Seconds): "Mothers of District Alpha, protect your child's tomorrow. The polio vaccination team will visit your house from Monday to Thursday. The vaccine is safe, effective, and free. Even if your child has been vaccinated before, every dose adds more protection. Make sure every child under five receives the drops!".

Field Challenges and Adaptive Decisions

Implementation in mixed rural and peri-urban districts presented several critical challenges that required rapid project adaptation.

Case Study: Nomadic Movement in Rural District Beta

During Week 4, surveillance reports indicated the movement of a large nomadic group from the neighboring region into District Beta. The original microplan did not include these seasonal settlements.

- **Adaptive Decision:** Project Leader Escriva Josemaria authorized the immediate deployment of a "Transit Team" at the local water point and cattle market. These teams operated outside the standard house-to-house hours to capture children as they moved with their herds.

Case Study: Vaccine Hesitancy in Peri-Urban Informal Settlements

A cluster of persistent refusals was identified in Ward 7, driven by rumors about the vaccine's origin.

- **Adaptive Decision:** The team activated the "Refusal Resolution Protocol," which involved pausing standard vaccination and inviting a respected local pediatrician and a prominent Imam to conduct a "Community Dialogue". Following this engagement, 93% of the recorded refusals in the ward were successfully resolved and children were vaccinated.

Field Decision Matrix

Challenge Encountered	Evidence Source	Rapid Adaptation
Team Fatigue/Poor Marking	Supervisor Checklist	Rotating teams to lower-workload rural sectors.
Cold Chain Break (Power)	Temp Monitor Alarm	Moving stock to district hospital backup generator.
Urban Migration Gaps	Tally Sheet Discrepancy	Increasing daily team targets by 10% for urban sectors.
Supply Stock-out (Rural)	Mid-day Supervisor Log	Deployment of motorcycle logistics runner with buffer stock.

Visual Field Artifacts

Standardized physical artifacts ensure that the campaign is recognizable and that the procedures remain consistent across hundreds of teams.

1. **House Marking Chalk/Markers:** Every household entrance is marked with the campaign round, team number, and date. A marking such as "R1 24/10/25 P3 C2" indicates Round 1, the date, 3 children found, and 2 children vaccinated (one missing).

2. **Vaccination Tally Sheet:** A structured form with rows for age groups (year and years) and columns for "Vaccinated," "Not at Home," "Refusal," and "Sick".
3. **The Purple Finger Marker:** A 5% Gentian Violet marker used to mark the left little finger of vaccinated children. The presence of the mark is the only accepted proof of vaccination during independent monitoring.
4. **Vaccine Vial Monitor (VVM):** A heat-sensitive label on every vial. If the inner square is the same color or darker than the outer circle, the vial must be discarded. Teams are trained to check this at every house.

Project Learning and System Strengthening

The conclusion of the SIA provides a unique window into the broader health system's performance. By identifying settlements that were entirely missing from official records, the microplanning process has updated the district's population profile for all future health interventions.

Asset transition is a key focus of the post-campaign phase. Cold chain equipment deployed for the SIA, such as solar-powered ILRs, is permanently integrated into the district's routine immunization infrastructure. Furthermore, the community mobilizer networks established during the campaign are being transitioned into "Health Guardians" to support surveillance for other vaccine-preventable diseases and maternal health outreach.

The project has demonstrated that in mixed rural and peri-urban districts, the integration of GIS technology with community-driven social mobilization is the only way to reach the "zero-dose" child and ensure that no community remains invisible to the health system.

Final Summary of Operational Metrics

Component	Target	Final Achieved	Status
Administrative Coverage		(Reflects population influx)	Exceeded
Real Coverage (IM)			Achieved
LQAS Pass Rate		(One rural lot failed)	Partial
Refusal Resolution			Achieved
Settlement Reach		(Verified via GIS/VTS)	Achieved

Under the leadership of Escriva Josemaria, this campaign has successfully interrupted transmission risks in the target districts, leaving behind a more resilient and data-informed public health infrastructure.

Operational SOP: The Vaccination Session

1. **Arrive at Household:** The team greets the caregiver using local language and introduces the campaign using the "Guardians of Health" identity.
2. **Screening:** The recorder asks how many children under 5 live in the house, including visitors.
3. **Vial Check:** The vaccinator checks the VVM and expiry date, shaking the vial to ensure the vaccine is well-mixed.
4. **Administration:** The vaccinator administers two drops into the child's mouth, ensuring no contact between the dropper and the mouth.
5. **Marking:** The recorder applies the purple ink to the child's left little finger and records the data on the tally sheet.
6. **House Marking:** The team marks the house exterior and provides the caregiver with a "leave-behind" flyer about the next round.

This documentation represents a full-scale, real-world implementation framework for a Polio SIA, adhering to the technical standards of the *Global Polio Eradication Initiative*.

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