

INSTITUTIONAL FUNDING & PARTNERSHIP PROSPECTUS

Securing Maternal & Child Healthcare Pathways Through Operational Intelligence

A deterministic framework to trace reproductive, maternal, newborn, and child health (RMNCH) patient journeys, eliminating critical dropout gaps through automated operational inference and targeted community health worker outreach.

Target Implementation: East Africa (Kenya Validation Pilot)

Focus Sector: Global Health Systems & Infrastructure

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Framework Paradigm: Deterministic Adherence Engine

Data Governance: Compliance-First (DPA 2019 / DHA 2023)

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1. Executive Summary

The RapidRisk™ Global Continuity Programme (GCP) introduces a rigorous, enterprise-ready software infrastructure designed to solve one of the most persistent challenges in global health: patient attrition across the Reproductive, Maternal, Newborn, and Child Health (RMNCH) continuum. Every year, millions of expectant mothers in low- and middle-income countries (LMICs) fall out of active care pathways due to fragmented records, delayed reporting, and system blindness.

Rather than introducing new hardware or displacing existing national technical investments, our platform functions as an operational intelligence layer that integrates natively with existing health registries, such as the District Health Information System (DHIS2). By extracting and synthesizing longitudinal patient data streams, the system automatically detects execution gaps relative to international clinical standards, scores patient-level risks using deterministic clinical criteria, and balances outreach workloads across local community health networks.

RapidRisk™ is actively seeking strategic philanthropic and institutional partners to fund its Phase 1 Validation Pilot in Kenya. This prospectus outlines our technical philosophy, architecture abstraction, strict data governance protocols, and the structured rollout strategy designed to secure care pathways for thousands of mothers and newborns.

Strategic Objective: To establish a replicable, high-density data pipeline that achieves a measured 30% reduction in system-level care attrition between major antenatal and postnatal milestones within a 12-month pilot execution timeline.

2. The Structural Challenge: Care Pathway Attrition

In low-resource settings, maternal and neonatal mortality is rarely driven by a complete absence of clinical facilities. Instead, it is heavily accelerated by a breakdown in care continuity. The World Health Organization prescribes rigorous, chronologically bound check-up structures for antenatal and postnatal protection. However, actual longitudinal adherence is severely undermined by several institutional hurdles:

Fragmented Data Silos

Patient encounters remain isolated within local paper registers or disparate electronic subsystems, preventing a unified,

Retrospective Blindness

Existing national reporting layers are fundamentally aggregate and retrospective. Ministries receive data weeks or months after

Frontline Overburdening

Community Health Workers (CHWs) manage expansive geographic regions with little objective direction. Lacking targeted triage mechanisms,

longitudinal view of an individual's gestational or postpartum journey across clinics.

reporting periods close, transforming missed opportunities into historical statistics rather than actionable interventions.

their limited outreach hours are rarely aligned with the highest-risk dropouts.

When a patient misses a critical antenatal check-up, the window to detect and mitigate life-threatening complications—such as pre-eclampsia, gestational diabetes, severe anemia, or malpresentation—closes rapidly. By the time the drop-off is recognized retrospectively, preventable clinical complications may have already unfolded.

3. The Technical Framework: Operational Inference

The core architecture of the RapidRisk™ platform relies on a sophisticated, multi-stage data processing and inference framework. It purposefully avoids statistical black-boxes and "AI magic" in favor of absolute transparency, auditability, and clinical correctness. MoH data officers and programmatic administrators must be capable of tracing the exact logical path that led the system to prioritize one specific patient over another.

3.1. Stream Ingestion & Record Synthesis

The system interfaces with facility-level logs and national trackers via a robust ingestion layer. Raw incoming transactional records are ingested through secure asynchronous workers. Since incoming data from disconnected regional clinics often features typographical variance, a non-probabilistic deduplication layer parses individual encounters into a singular, continuous longitudinal record. This establishes an uncompromised timeline of every contact, scheduled date, and historical clinical parameter recorded for the patient.

3.2. Deterministic Adherence Engine

Once a patient's care timeline is synthesized, it is continuously evaluated by a stateless, deterministic gap-detection engine. This engine acts as a digital execution of international medical schedules. The architecture maps temporal constraints natively:

- **WHO Antenatal Care (ANC) Schedule Validation:** Evaluates active pregnancies against the 8-contact framework. Gaps are automatically categorized into `overdue_anc` or `missed_anc` based on strict tolerance windows that automatically compress as the Estimated Date of Delivery (EDD) nears.
- **WHO Postnatal Care (PNC) Schedule Validation:** Traces critical postpartum windows, applying particular analytical weight to the immediate high-risk periods (PNC 1 within 24 hours; PNC 2 within 48–72 hours; PNC 3 within 7–14 days).
- **Delivery Registration Auditing:** Automatically triggers a critical `missed_delivery_registration` flag if a pregnancy remains classified as active past EDD +

14 days without an associated delivery log, addressing potential unmonitored home births or adverse events.

- **Lost-to-Follow-Up (LTFU) Identification:** Flags patients showing consecutive chronological omissions or complete data absence for over 60 days.

Data Volume & Sufficiency Warning

Population metrics require strict data volume thresholds to ensure analytical validity. Facility-level performance comparisons require a minimum sample density ($n \geq 30$ active pathways) to avoid statistical skew. The framework actively enforces these warnings to prevent premature programmatic conclusions during initial pilot scaling.

4. Evidence-Grounded Risk Prioritization

To convert detected gaps into optimized operational responses, the platform executes a rule-based additive scoring model. Every risk weight is grounded strictly in peer-reviewed maternal health literature and regional drop-out studies. The system aggregates points across multiple clinical vectors, capping the cumulative risk score at a maximum of 100.

CLINICAL / CHRONOLOGICAL FACTOR	RISK POINTS	EVIDENCE BASE & RATIONALE
Delivery Registration Overdue (EDD +14 Days, No Record)	+40	High risk of unrecorded maternal/neonatal mortality or unassisted home delivery.
Early Postnatal Omission (PNC 1 or PNC 2 Missed)	+30	WHO 2022 Postnatal Guidelines highlight the first 72 hours as the highest mortality window.
Chronological Delay Excess (Overdue by >14 Days)	+40	Strong statistical indicator of complete pathway dropout and true LTFU trajectory.
Late-Pregnancy Window (Gestational Age $\geq$ 36 Weeks)	+20	Pre-eclampsia, malpresentation, and PROM risks escalate; requires immediate outreach.
Historical Obstetric Complications (Prior Stillbirth / Death)	+15	Elevated clinical recurrence risk requiring enhanced tracking stringency.
Adolescent or Advanced Maternal Age (<18 or >40 Years)	+10	Standard physiological risk categorization for vulnerable obstetric cohorts.
Maternal Primiparity (First Pregnancy Registered)	+10	Elevated risk of unrecognized obstetric complications or poor care familiarity.

Based on the total additive score, patients are assigned to distinct operational tiers that map directly to targeted response times: **CRITICAL** (≥70 points, requiring a 24-hour community dispatch), **HIGH** (40–69 points, requiring a 72-hour outreach window), and **STANDARD** (<40 points, targeted for standard 7-day checks).

5. Frontline Triage & Worker Load Balancing

When a gap is confirmed and scored, the platform automatically synthesizes an actionable outreach task. It bypasses ambiguous dashboards and delivers explicit instructions directly to community structures.

The software utilizes a regional optimization algorithm to match tasks to Community Health Workers based on administrative boundaries. To prevent system bottlenecks, the engine executes automatic load-balancing. If multiple CHWs are registered within a sub-county or village unit, the task is dynamically routed to the worker with the fewest active assignments. If an administrative unit lacks an assigned worker, the task is escalated to the County Programme Officer for manual assignment.

This closed-loop system is bidirectional. When a CHW completes an outreach visit, the outcome is logged, immediately updating the main data cache. The engine then resolves the open care gap and automatically queues a fresh patient-level scan to re-verify compliance against the subsequent milestones in the maternal pathway.

6. Rigorous Data Governance & Sovereignty

Health infrastructure deployed within sovereign nations must respect local privacy mandates and maintain international standards of data trust. RapidRisk™ embeds governance natively into its data layer:

- **Legislative Compliance:** The framework explicitly adheres to the *Kenya Data Protection Act 2019* regarding sensitive health data categorization and purpose limitation, and aligns with the data residency mandates of the *Kenya Digital Health Act 2023*.
- **Immutable Audit Trails:** Every read, write, and modification executed across the patient registry is logged to an immutable system audit table. This ensures full accountability for both system-driven actions and clinical user entries.
- **Data Minimization & Isolation:** The system collects and retains only fields strictly necessary for pathway calculation (LMP, EDD, child birthdate, contact dates, and basic administrative localization). No broad financial, behavioral, or unrelated clinical records are ever ingested.

7. Implementation Roadmap: The Kenya Pilot

To thoroughly validate the operational efficacy of our deterministic framework, RapidRisk™ has structured a 24-month multi-phase roadmap focused on high-need sub-counties in Kenya, collaborating directly with regional health directorates.

PHASE & TIMELINE	CORE OPERATIONAL OBJECTIVES	TECHNICAL MILESTONE
Phase 1 Months 1 - 6	Natively integrate the ingestion layer with localized facility instances; configure sub-county administrative maps; onboard and train approximately 15 Community Health Worker supervisors across selected clinics.	ACTIVE PIPELINE Secure DHIS2 sync & data stabilization
Phase 2 Months 7 - 12	Scale active longitudinal tracing to encompass approximately 10,000 active patient pathways. Monitor automated task dispatch accuracy and run monthly data quality audits on deduplication thresholds.	EVALUATION MODE Mid-point pilot impact reporting
Phase 3 Months 13 - 24	Expand infrastructure footprint across adjacent counties. Transition operational controls directly to Ministry of Health IT teams via standardized multi-tenant handover protocols.	REGIONAL SCALING Full institutional handoff

8. Institutional Partnership & Capital Allocation

RapidRisk™ is seeking **strategic philanthropic capital and institutional grant partnerships** to execute the Phase 1 Validation Pilot and secure the initial technical foundation for the regional expansion. Funding will be deployed strictly into three structural pillars, completely independent of commercial enterprise operations:

Pillar A: Core Integration & Engineering Customization (40%)

Direct adaptation of the open ingestion adapters to conform with regional database mutations, localized script formatting, and data validation matrices unique to target county clinics.

Pillar B: Frontline Training & Workflow Localization (35%)

Developing training curricula for sub-county health managers, providing operational manuals to community health worker networks, and managing field feedback loops to optimize task dispatch logic.

Pillar C: Independent Evaluation & Impact Auditing (25%)

Engaging third-party epidemiological and data-quality experts to independently verify system compliance, assess attrition reductions, and compile formal policy briefs for national Ministry consumption.

We invite institutional donors, foundations, and global health innovators to collaborate with us in establishing this infrastructure. To request full technical documentation, inspect our clinical validation schedules, or arrange an operational briefing, please contact our program management office at **grants@rapidrisk.io**.