SAIA-SCALE
Micro-costing a government-led program

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May 23, 2018

Systems Analysis and Improvement Approach (SAIA)

Systems engineering is a methodical, disciplined approach for the design, realization, technical management, operations, and retirement of a system. It is a way of looking at the “big picture” when making technical decisions.


SAIA is a package of systems engineering tools including:
- Cascade analysis
- Flow mapping
- Continuous quality improvement (CQI)

Well suited to prevention of mother-to-child transmission (PMTCT) process improvements

PMTCT Cascade

- Antenatal care
  - ANC attendance
  - HIV counseling & testing
  - CD4 testing
  - Provision of ARV prophylaxis/PPO to mother
- Birth
  - Safe delivery
  - Provision of prophylaxis to infant
  - Education on safe infant feeding and care
- Postpartum care
  - Viral load testing
  - Safe infant feeding
  - Infant follow-up care and HIV testing
  - Family planning
  - Linkages to long-term HIV care and treatment

SAIA Step 1

Describe pMTCT performance and identify priority areas for improvement

- Use of the pMTCT Cascade Analysis Tool (PCAT) to provide a ‘systems view’ of the sequential, linked pMTCT cascade steps

SAIA Step 2

Pregnant woman arrives for 1st ANC visit with MCH nurse

Day 1

HIV Rapid Test

CHW opens chart

Day 1

HIV+ woman to reception

CD4 Nurse

• Blood draw for CD4 count (if initial visit is on Monday, Tuesday or Wednesday)
• Triage for immediate care
• Determines WHO clinical stage

Day 1

CD4 returns to nurse for CD4 results

≥ Day 28

III - IV

• Woman receives AZT & sdNVP

> 250

• CD4 nurse prescribes CTZ and orders blood tests (biochemistry, haematology)

ART Committee (at Nhamatanda Rural Hospital) to determine eligibility

ART eligible?

Evaluation with physician's assistant (Tuesdays)

~1-4 weeks after dx

Social worker gives woman the ART (triple therapy) prescription

~1-4 weeks after dx

DOT for the first 14 days of ART

SAIA Step 3-5

Continuous Quality Improvement

• Define & implement facility-specific workflow adaptations
• Monitor changes in performance; initiate additional iterations
• Repeat analysis and improvement cycle

SAIA 3-Country Study (2013-2015)

~Efficacy trial

• Cluster RCT conducted in Côte d’Ivoire, Kenya and Mozambique
• Tested impact of SAIA on the PMTCT cascade
• Intervention implemented by HAI study nurses
• Resulted in improvements in
  • ART uptake (13.3% vs. 4.1% increase)
  • Early infant diagnosis (11.6% vs. 0.7% increase)

SAIA-Scale Study (2017-2021)

Overall objective

~Effectiveness trial

• Evaluate a district government-led, at-scale programming approach to the SAIA intervention

Study setting: Manica Province, Central Mozambique

• Total population: ~2 million
• 15.3% adult HIV prevalence
• 12 districts; 9-13 total health facilities per district
• Three highest-volume health facilities per district to be included in the intervention
SAIA-Scale Study design

- Stepped wedge
  - 3 x 12 month waves
  - 4 districts per wave
- Implemented by MCH district nurses
- Mentored by HAI study nurses in the intensive phase

We are here (2 months into implementation)

SAIA-SCALE SPECIFIC AIMS & METHODS

Aim 1: RE-AIM
- Develop an effective district-based dissemination and implementation strategy for the SAIA intervention (SAIA-SCALE), using the RE-AIM model to evaluate the program's

- **Reach**: Health facilities and population reached
- **Effectiveness**: PMTCT process, HIV infections averted, viral suppression
- **Adoption**: Proportion and determinants of districts and facilities adopting the intervention
- **Implementation**: Successes, failures, process evaluation
- **Maintenance**: Districts and facilities sustaining the intervention at 12, 24, 36 months

Aim 2: Cost-effectiveness
- Using activity-based micro-costing and mathematical models of HIV transmission, estimate the budget and program impact from the payer perspective to scale-up the SAIA intervention compared to the standard of care.
Aim 2 detailed objectives

• Projected cost and ICER for different scale-up scenarios, e.g:
  – Nationwide
  – High-prevalence provinces only
  – Largest health facilities only

SAIA-SCALE COSTING METHODS

Costing methods

1. Micro-costing
   • Results can be disaggregated

2. Bottom-up, activity-based
   • Based on project activities
   • More accurate and comprehensive
   • However, more time-consuming and complex

Activity-based cost analysis

1. Cost analysis framework development
   – List broad program activities (e.g. supervision of health facilities)
   – List components of each activity that incur costs (e.g. supervisors’ time)
   – Review and refine together with program implementers
   – Brainstorm data collection methods to quantify each component

2. Data collection
   – Extract data from existing sources as much as possible (e.g. public records of government salaries)
   – Measure as many remaining cost components as possible (e.g. person-time)
   – Estimate remaining variables (e.g. travel time, distances)

3. Multiply cost components by unit costs
### Main SAIA-SCALE implementation activities

1. Training district supervisors
2. Supervision visits to health facilities
3. Micro-interventions within health facilities

Main cost-incurring components of this activity:
- Person-time
- Transportation

### Supervision visits to health facilities

- **Description:**
  - District MCH supervisors visit health facilities
  - Guide health facility staff through PCAT, flow mapping, and CQI
  - Monitor progress
- **Data collection:** Tablet-based survey, filled by district MCH supervisors
- **Status:** underway (2 months into 36-month implementation period)

### Snapshot of cost analysis framework

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>COST COMPONENT</th>
<th>DATA TYPE</th>
<th>DATA SOURCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision visits to health facilities</td>
<td>Costable units</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Metadata (data, location, etc.)</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Number of district supervisors (health facility visitors)</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Health facility staff visited</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Duration supervision visit</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Transportation type and origin</td>
<td>Measured</td>
<td>REDCap Form2B</td>
</tr>
<tr>
<td></td>
<td>Drive time or distance for supervisors</td>
<td>Estimated</td>
<td>Google Earth, interviews with district supervisors</td>
</tr>
</tbody>
</table>

### Form 2B, Facility visit survey

- **Data collected**:
  - Time
  - GPS coordinates
  - Enumerator
  - District
  - Health facility visited
  - Arrival time
  - Departure time
  - Transportation type
  - Transportation origin
  - Health facility visitors (organization, job position)
  - Staff visited (by level)
  - Activities description
  - Any other notes
Form 2B: screen-capture from REDCap

<table>
<thead>
<tr>
<th>Question in Portuguese</th>
<th>Screen Capture</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qual é o tipo de transporte que você viaja?</td>
<td></td>
</tr>
<tr>
<td>Quem era o passageiro que viajava com você?</td>
<td></td>
</tr>
</tbody>
</table>

District supervisors’ tablet setup

- Intuitive layout
- Guides alongside apps
- Remove excess apps
- Direct communication for troubleshooting
- Data collection and implementation tools

Results:

- 70 REDCap surveys submitted
- Detailed picture of implementation

Discussion

- What has worked well
  - Simple forms
  - Lots of piloting (and Keshe patiently revising tools)
  - Integrating forms into implementation
- HAI uses REDCap data to track implementation
- Per-diems for district supervisors are contingent on submitting REDCap data

- What hasn’t worked well
  - Poor internet connections in some districts
  - REDCap translations incomplete
  - REDCap longitudinal forms too complicated for our purposes
Thank you

**RE-AIM: Reach**

- Proportion of health facilities and population in Manica province reached

<table>
<thead>
<tr>
<th>Target</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>92% of health facilities</td>
<td>Reports from study personnel</td>
</tr>
<tr>
<td>83% of mother-infant pairs</td>
<td>Health management information systems data</td>
</tr>
</tbody>
</table>

**RE-AIM: Effectiveness**

- Effect on PMTCT process measures and Option B+ effectiveness at the individual level

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Value 1</th>
<th>Value 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>PMTCT</td>
<td>Process measures</td>
<td>80%</td>
<td>90%</td>
</tr>
<tr>
<td>Option B+</td>
<td>Effectiveness</td>
<td>70%</td>
<td>80%</td>
</tr>
</tbody>
</table>
RE-AIM: Effectiveness

Effect on PMTCT process measures and Option B+ effectiveness at the individual level

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maternal viral load testing</td>
<td>#women tested within 30 days post-partum</td>
</tr>
<tr>
<td>Early infant diagnosis</td>
<td>#infants w. PCR by 8 weeks, infants presenting to care by 8 weeks</td>
</tr>
</tbody>
</table>

- Linear mixed-effects models; clustering by district
- Excludes data from the roll-out phase

RE-AIM: Adoption

Proportion and determinants of districts and facilities adopting the intervention

<table>
<thead>
<tr>
<th>Target</th>
<th>Definition</th>
</tr>
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<tbody>
<tr>
<td>95% of targeted facilities</td>
<td>Districts and facilities that attend training and initiate analysis and improvement cycles</td>
</tr>
</tbody>
</table>

Determinants of adoption:
- Organizational Readiness for Change assessment scale
  - Prior to the intensive phase in each facility
  - 8 frontline staff / managers per facility
  - 8 managers per district

RE-AIM: Implementation

Core elements and determinants of implementation successes and failures

- Consolidated Framework for Implementation Research
  - 48 focus group discussions (district managers, facility managers, frontline PMTCT nurses)
  - 84 in-depth interviews (frontline health workers, MCH supervisors)
  - Exit of each implementation wave

Differential improvement by core components
- Structural characteristics
  - Contextual factors
  - Implementation process
RE-AIM: Maintenance

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Data source</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proportion of districts and facilities continuing to implement SAIA-SCALE with monthly meetings and CQI cycles</td>
<td>Study staff reports</td>
</tr>
<tr>
<td>Target:</td>
<td></td>
</tr>
<tr>
<td>&gt;90% and 12 months</td>
<td></td>
</tr>
<tr>
<td>&gt;80% at 24 months</td>
<td></td>
</tr>
<tr>
<td>&gt;65% at 36 months</td>
<td></td>
</tr>
<tr>
<td>District and staff perspectives on determinants of sustained implementation</td>
<td>Focus group discussions and in-depth interviews</td>
</tr>
</tbody>
</table>