OpenSRP-Indonesia: Innovative features for data interoperability for frontline health workers

Summit Institute of Development, Mataram, Indonesia
Provincial and District Governments of West Nusa Tenggara, Indonesia
Harvard T.H. Chan School of Public Health, Boston, USA

Improving Routine Data for Child Health in National Health Information Systems: Africa Regional Workshop
19-22 September 2017
Johannesburg, South Africa

Anuraj Shankar
Harvard T.H. Chan School of Public Health
Evolution of mHealth approaches for frontline workers (FHW)

- **1st Gen**: paper forms migrated to digital media (surveys, forms). **One-way information flow**.
- **2nd Gen**: point-of-contact smart processing of alerts or risk flags. **Two-way information flow**.
- **3rd Gen**: Server-based systems and data processing. Action beyond point-of-contact. SMS text, scheduling reminders. **Multiple two-way information flows**.
- **4th Gen**: Coordinated data collection and use. Action across multiple workers and systems. **Multiple three-way information flow**.
- **5th Gen**: Learning systems guided by artificial intelligence and advanced analytics. **Dynamic data collection and multiple information flows**.
Building the App & System
Health Workers Deserve
and
Clients Need
Open Smart Register Platform

OpenSRP

OpenSRP is an open source mobile health platform that allows frontline health workers to electronically register and track the health of their entire client population.

www.smartregister.org
What is OpenSRP

Digital platform consisting of:

- Open source software
- Community of global developers for sustainable innovation
- Core feature set across deployments:
  - Electronic Service Record (based in existing paper registers)
  - Unique IDs for clients, providers, facilities
  - Linked longitudinal health record
  - Client management and work-planning
  - Decision-support
  - Concept Dictionary (defined data and indicators)
  - Automated Reporting
THRIVE/OpenSRP Group

- WHO + Country Technical Partners + Impact Evaluation Partners

THRIVE Consortium Implementation Partners
Community health concepts contributed to global CIEL dictionary

159 concepts contributed:

- **mHealth**
  - Mobile number assigned to SIM
  - Encounter start/end date and time
  - GPS coordinates

- **Demographic**
  - Total number of people living in household
  - Relationship to head of household
  - Ethnicity

- **Clinical**
  - Blood group
  - Stage of labour
Open Smart Register Platform

Tablet APP

WhatsApp/Facebook Mobile APP

Electronic Forms

Client Record Electronic Form

Tablet Client Listing View
OpenSRP Mobile Phone Immunization Application
Sofia integrates with social media as an ECD assistant
Sofia

- Artificial Intelligence (AI) driven chat bot
- Accessed by friending Sofia on Facebook
- Provides evidence-based real-time assessment and advice
- Big data approach to assisting ECD interventions

Typically replies within seconds
Indonesia OpenSRP Site

- Multi cadre deployment: midwives, vaccinators, nutrition workers, early childhood development (ECD) workers
  - Involving 133 front line workers overall, covering 650,000 persons and approximately 18,000 annual pregnancies
OpenSRP multi-cadre deployment

- **Nutritionist App**
  - Child's data
  - Child's nutritional status
  - Mother's data
  - Child's developmental status

- **Vaccinator App**
  - Child's data
  - Child's immunization status
  - Mother's data
  - Child's developmental status

- **Midwife App**
  - Child's data
  - Child's immunization status
  - Child's nutritional status
  - Child's developmental status

- **ECD App**
  - Child's data
  - Child's immunization status

---

**summit Institute of Development**
Challenges of duplication and fragmentation across workers

- **Identifiers are recorded differently**
  - Names are different spellings and abbreviations.
    - Mohamed Iqbal; Lalu Mohamed Iqbal; LM Iqbal; M Iqbal
  - ID numbers are different

- **Dates may be written differently**
  - Local date system versus global date system

- **Indicators may be recorded differently**
  - kg versus gm

- **Loss of time in duplicating information**
- **Lost data at the aggregation phase**
- **Confusion in tracking clients**
<table>
<thead>
<tr>
<th>FHWs</th>
<th>Similar Identity Data Collected</th>
<th>Similar Data Collected Across FHWs</th>
<th>Unique Data Collected each FHWs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Midwife</td>
<td>● Mother’s Name</td>
<td>● Child’s Nutritional Status</td>
<td>● Mother’s Antenatal and Postnatal Care visit</td>
</tr>
<tr>
<td></td>
<td>● Mother’s Birthday</td>
<td>● Child’s Immunization Checklist</td>
<td>● Neonatal and Child Care visit</td>
</tr>
<tr>
<td></td>
<td>● Child’s Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Child’s Birthday</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Village</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nutritionist</td>
<td>● Mother’s Name</td>
<td>● Child’s Nutritional Status</td>
<td>● Child’s Nutritional Status</td>
</tr>
<tr>
<td></td>
<td>● Child’s Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Child’s Birthday</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Village</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vaccinator</td>
<td>● Mother’s Name</td>
<td>● Child’s Immunization Checklist</td>
<td>● Child’s Immunization Checklist</td>
</tr>
<tr>
<td></td>
<td>● Child’s Name</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Child’s Birthday</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Village</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ECD Worker</td>
<td>● Mother’s Name</td>
<td>● Child’s Growth Faltering</td>
<td>● Child’s developmental delay (milestones, vision, hearing)</td>
</tr>
<tr>
<td></td>
<td>● Child’s Name</td>
<td>● Child’s Weight</td>
<td>● Child’s Mental-emotional delay (socio-emotional behavior problems, autism and ADHD)</td>
</tr>
<tr>
<td></td>
<td>● Child’s Birthday</td>
<td>● Child’s Height</td>
<td></td>
</tr>
<tr>
<td></td>
<td>● Village</td>
<td>● Child’s Head Circumference</td>
<td></td>
</tr>
</tbody>
</table>
## Midwife’s data

<table>
<thead>
<tr>
<th>FHWs</th>
<th>Identity Data Collected</th>
<th>Data Collected</th>
<th>Similar Data Collected Across FHWs</th>
</tr>
</thead>
</table>
| Bidan | ● Registration Date  
● Mother’s Name  
● Father’s Name  
● Village  
● Child’s ID No.  
● Child’s Name  
● Birthday  
● Gender  
● Maternal and Child Health booklet ownership (pink book) | ● Neonatal Visit 1, 2, 3  
(Visit date, Living status,  
Child’s condition, Treatment Given, Complication, HB0 Immunization, Cause of Illness, Cause of Death)  
● Baby’s Visit  
(Child’s Weight, Exclusive Breastfeeding, Child’s Nutritional Status, Result of Prescreening Developmental Questionnaire, Deviation, Vitamin A Given, Date of BCG, Polio 1, DPT/HB1/ Polio 2, DPT/HB2/ Polio 3, DPT/HB3/ Polio 4, Date of measles immunization)  
● Child’s Visit (5 y.o >)  
(Visit Date, Child’s Length/Height, Child’s Weight, Result of Prescreening Developmental Questionnaire, Deviation, Vitamin A Given) | ● Mother’s Name  
● Father’s Name  
● Village  
● Child’s ID No.  
● Child’s Name  
● Birthday  
● Child's Age  
● Child’s Gender  
● Child’s Weight  
● Child’s Height  
● Child's Immunization Checklist |
# Vaccinator’s Data

<table>
<thead>
<tr>
<th>FHWs</th>
<th>Identity Data Collected</th>
<th>Data Collected</th>
<th>Similar Data Collected Across FHWs</th>
</tr>
</thead>
</table>
| Vaccinator | ● Child’s No. in sub-village book  
● Child’s Name  
● Mother’s Name  
● Child’s Gender  
● Birthday | ● Camp name  
● Camp Location (Village)  
● Reference day of Camp  
● Date of Camp  
● Child’s immunization checklist  
  ○ Date of HB.1 Immunization  
  ○ Date of BCG immunization  
  ○ Date of Polio immunization  
  ○ Date of DPT/HB immunization  
  ○ Date of Polio 2 immunization  
  ○ Date of DPT/HB combo 2 immunization  
  ○ Date of Polio 3 immunization  
  ○ Date of DPT/HB combo 3 immunization  
  ○ Date of Polio 4 immunization  
  ○ Date of measles immunization  
  ○ Date of if child < 30 old-days dies  
  ○ Date of if child > 30 old-days dies  
  ○ Date if baby is relocated | ● Mother’s Name  
● Father’s Name  
● Village  
● Child’s ID No.  
● Child’s Name  
● Birthday  
● Child’s Age  
● Child’s Gender  
● Child’s Weight  
● Child’s Height  
● Child’s Immunization Checklist |
Number and proportion of unique or shared indicators

Overall approximately 40% of information requires duplication
Advantage of shared data records: 
fragmentation to completion

- **Expected data**
- **Actual data**
- **Compiled-shared data**

- Midwife
- Midwife
- Midwife

Nutritionist
Vaccinator
ECD
Coordinated and Networked Care: "More than the sum of its parts"
Facial recognition

Summit Institute of Development
Facial recognition shared across devices

- Facial vectors are shared across devices and workers
- Enables distributed recognition in place of id cards or fingerprints
- Recognition is confirmed by worker
Menu-driven Report

Supervisors and senior officers can review progress in real time.
Monthly HHH SCORES: FHW coaching is built on data-driven scores

• **Head Score (Midwife knowledge test)**
  • Score on multiple choice knowledge exam taken each month

• **Hand Score**
  • Based on number of on time visits and data quality
    • On time visits
    • Completeness of visit tasks
    • Data anomaly assessment (normality and plausibility)

• **Heart Score**
  • Based on responsiveness and care to the subgroup of high risk clients
OpenSRP Active Deployments in Indonesia with 133 front line workers covering 650,000 pop.
OpenSRP Indonesia Team

Science Team:
- Emmy Kardinasari
- Alya Hazfiarini
- Siti Adawiah
- Dina Putri
- Beth Prado
- Anuraj Shankar

Tech Team:
- M Ibrahim Iqbal
- Ahmad Wildan
- Ainul Hamadani
- Marwan
- Matt Berg (Ona)
- Peter Lubell-Doughtie (Ona)
- Carolyn Gulas (Ona)

Collaborating Institutions:
- Summit Institute of Development
- Indonesian Ministry of Health
- Provincial and District Governments of West Nusa Tenggara
- Harvard University
- UC Davis
- Ona Systems
- World Health Organization

Funding:
- Qualcomm Wireless Reach Initiative
- World Health Organization
- UNICEF
Thank you!