

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

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Improving Routine Data for Child Health in National Health Information Systems:
Africa Regional Workshop
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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.



NAME	THATCH NO.	DELIVERY INFO	COMPLICATIONS	PPVT	CHILD
Abhaya Tupeweli Lumbawangi	(25) 999999	Date: 30/05/14 Place: PNC Type: Normal			Male Birth Wt: 3.9 kg
Anurha Anur Senebelle	(25) 3452345	Date: 26/05/14 Place: PNC Type: Normal			Male Birth Wt: 3.4 kg
Geeta Gopi Chakurath	(24) 2583991	Date: 18/05/13 Place: SUBCENTER Type: Normal			Female Birth Wt: 3.4 kg
Vidya Vijay Chakurath	(25) 8884567	Date: 12/02/14 Place: SUBCENTER Type: Normal			Female Birth Wt: 3.4 kg

www.smartregister.org

What is OpenSRP

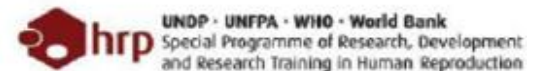
Digital platform consisting of:

- 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

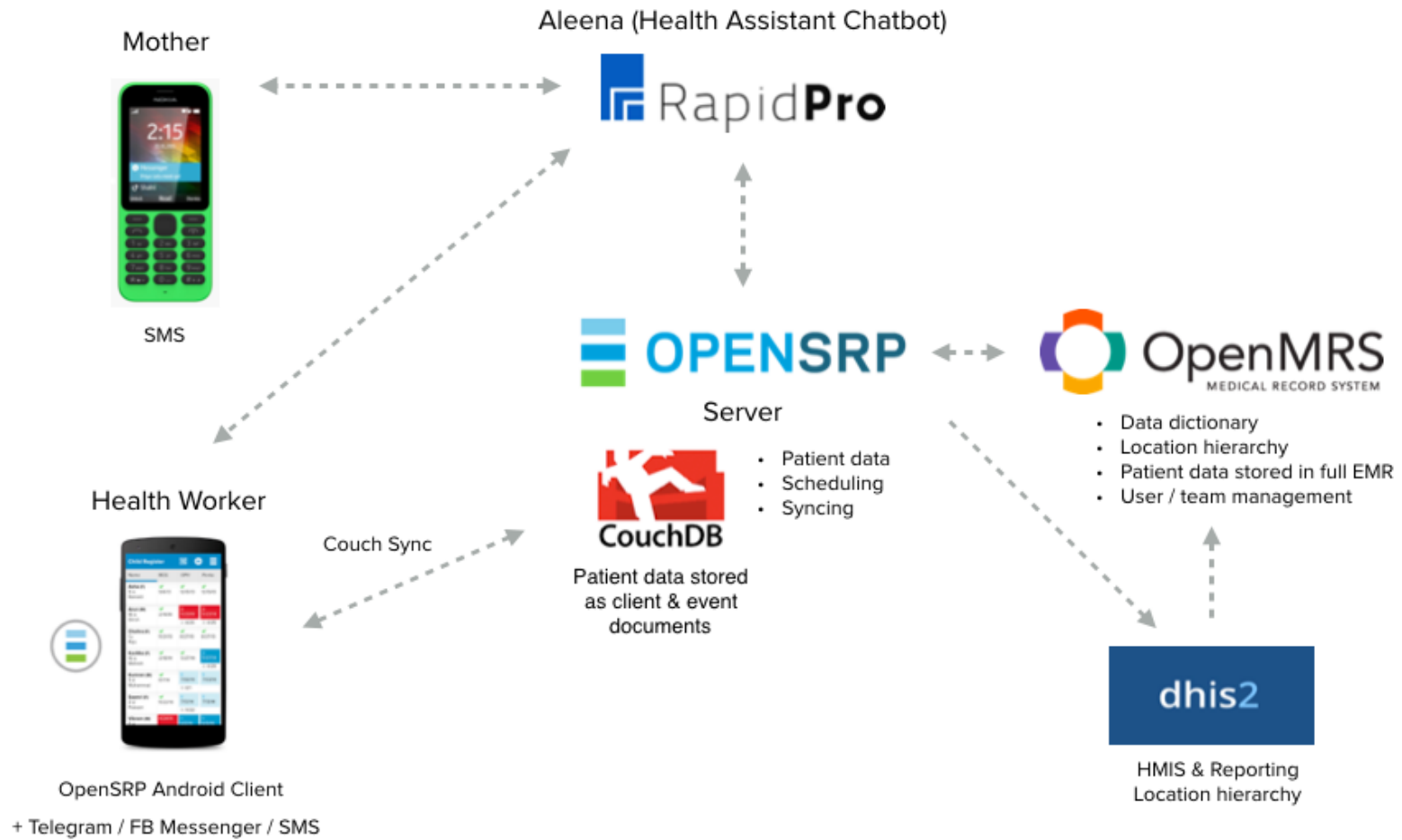
THRIVE/OpenSRP Group

- WHO + Country Technical Partners + Impact Evaluation Partners

THRIVE Consortium Implementation Partners



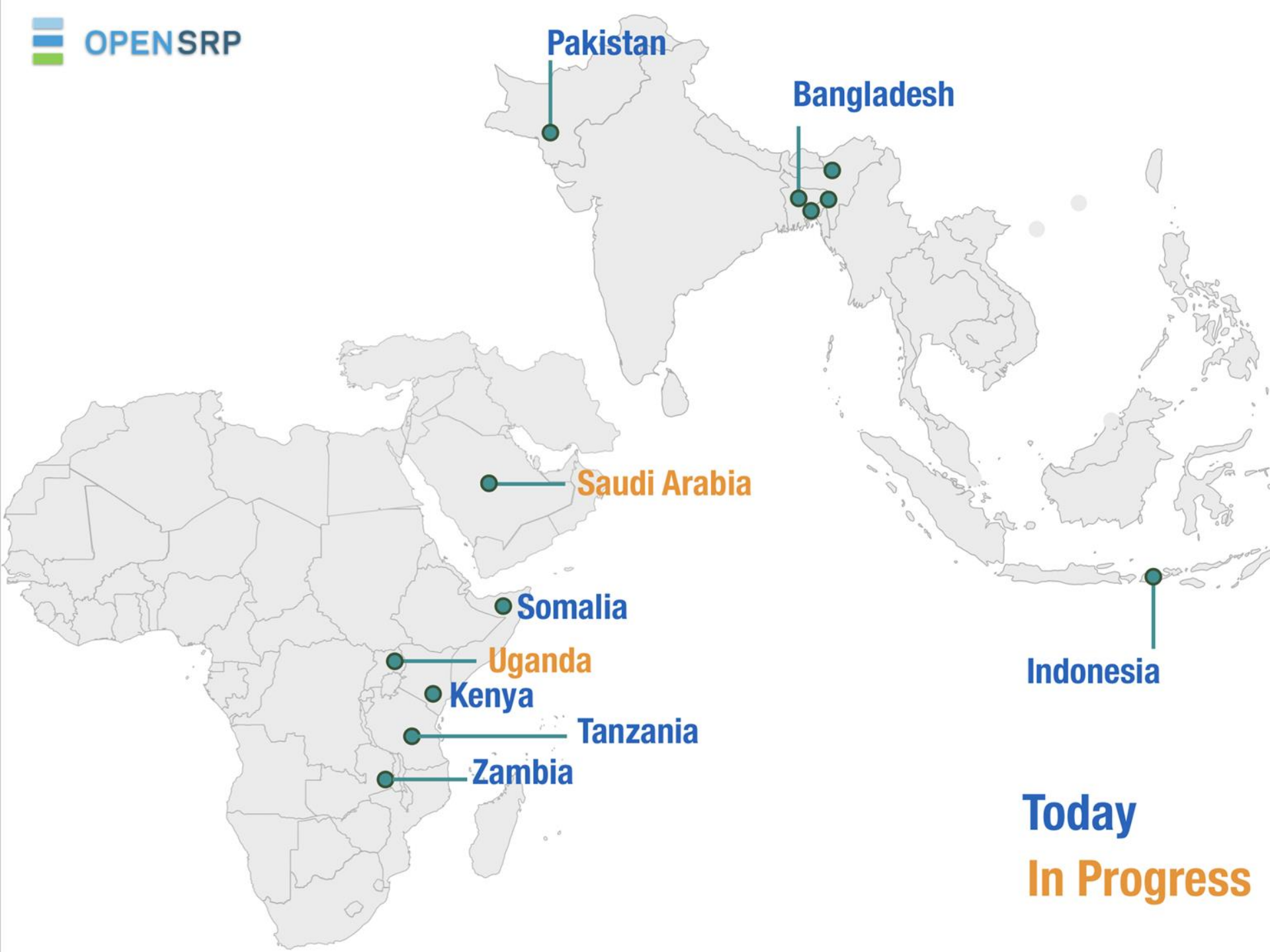
OpenSRP Technical Framework



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



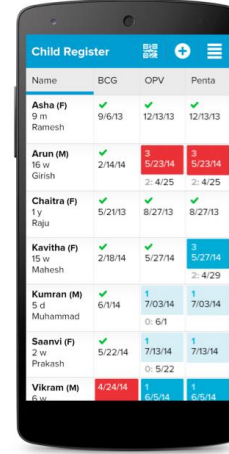
Today
In Progress

Open Smart Register Platform

Tablet APP



WhatsApp/ Facebook Mobile APP



Electronic Forms

Client Record Electronic Form

☒ Temperature ತಾಪಮಾನ

☒ Weight ತೂಕ

Temperature (F) ತಾಪಮಾನ (F)

Weight (in kgs) ತೂಕ (ಕೆ.ಎಸ್ ರಲ್ಲಿ)

75

Weight gain since last visit, ಕುಡಿಯುವ ದ್ರವಗಳು
ಮಾಂಸದಿಂದ ತೂಕ ಹೆಚ್ಚಿದುದೇ: 5 kgs ಕೆ.ಎಸ್

Abdominal measurements taken? ಹೊಟ್ಟೆಯನ್ನು
ಮಾಪನದಲ್ಲಿ ತೆಗೆದುಕೊಂಡಿದ್ದೀರಾ?

☒ Abdominal Height ಎತ್ತರದ ಅಳತೆ

☐ Fetal heart rate ಪ್ರಧಾನಿ ಹೃದಯದ ಧ್ವನಿ

☐ Fetal movement ಪ್ರಧಾನಿ ಚಲನೆ

Any abdominal measurements abnormal?
ಹೊಟ್ಟೆಯನ್ನು ಮಾಪನದಲ್ಲಿ ಅನ್ಯತಾಪಮಾನದಾದ್ದಾರಾ?

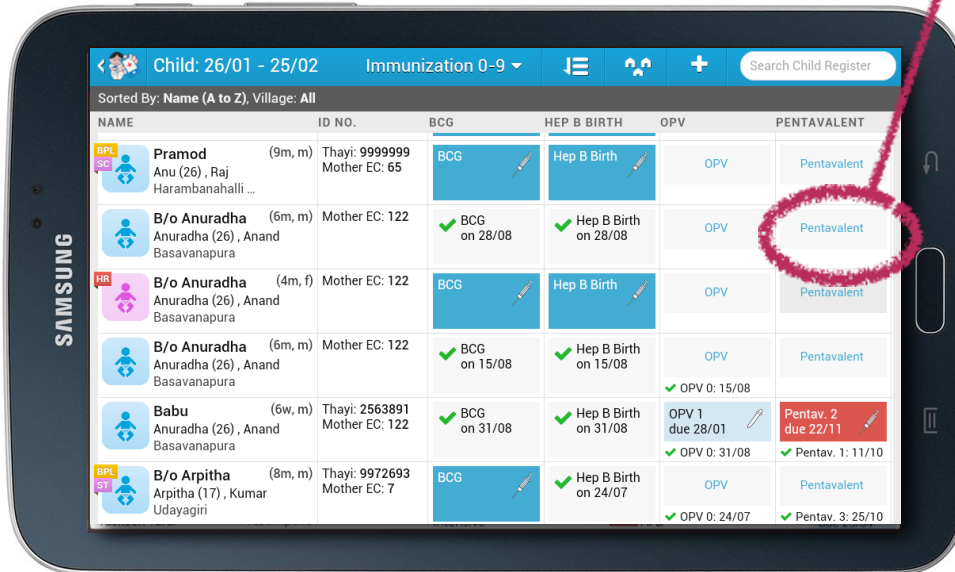
☐ Abdominal Height ಎತ್ತರದ ಅಳತೆ

☐ Fetal heart rate ಪ್ರಧಾನಿ ಹೃದಯದ ಧ್ವನಿ

☐ Fetal movement ಪ್ರಧಾನಿ ಚಲನೆ

Multiple pregnancy (twins, triplets)? ಸಾಕಾರಿಕತಾದ

Tablet Client Listing View





ZEIR







Linda Clinic



Search name or ID



Scan QR code

CHILD	AGE	ID	WEIGHT	DUE VACCINE
 B/o Angela Smith M/G: Angela	2m	2520591 003 / 17	Record weight	Record 6 weeks
 Joyce Mwanza M/G: Sarah	6w 4d	5425428 005 / 17	Record weight	Record 6 weeks
 Elizabeth Malime M/G: Ellen	7m 1w	6434664 002 / 17	Record weight	9 month: due 3 weeks
 Kennoni	3y 1 m	5463464 121 / 14	Record weight	✓ Fully immunized
 Robby M/G: Sandy	5 m 2d	3465511 111 / 16		 Inactive

OpenSRP Mobile Phone Immunization Application



ZamJab > Joyce Mwanza

Linda Clinic



Joyce Mwanza

EIR: 5425428 Age: 6w 4d

WEIGHT-FOR-AGE

[Record weight](#)

HER SIBLINGS



IMMUNISATION RECORD

DOB: 17/12/2016

Previous: 6 Weeks

✓ OPV 1

✓ Penta 1

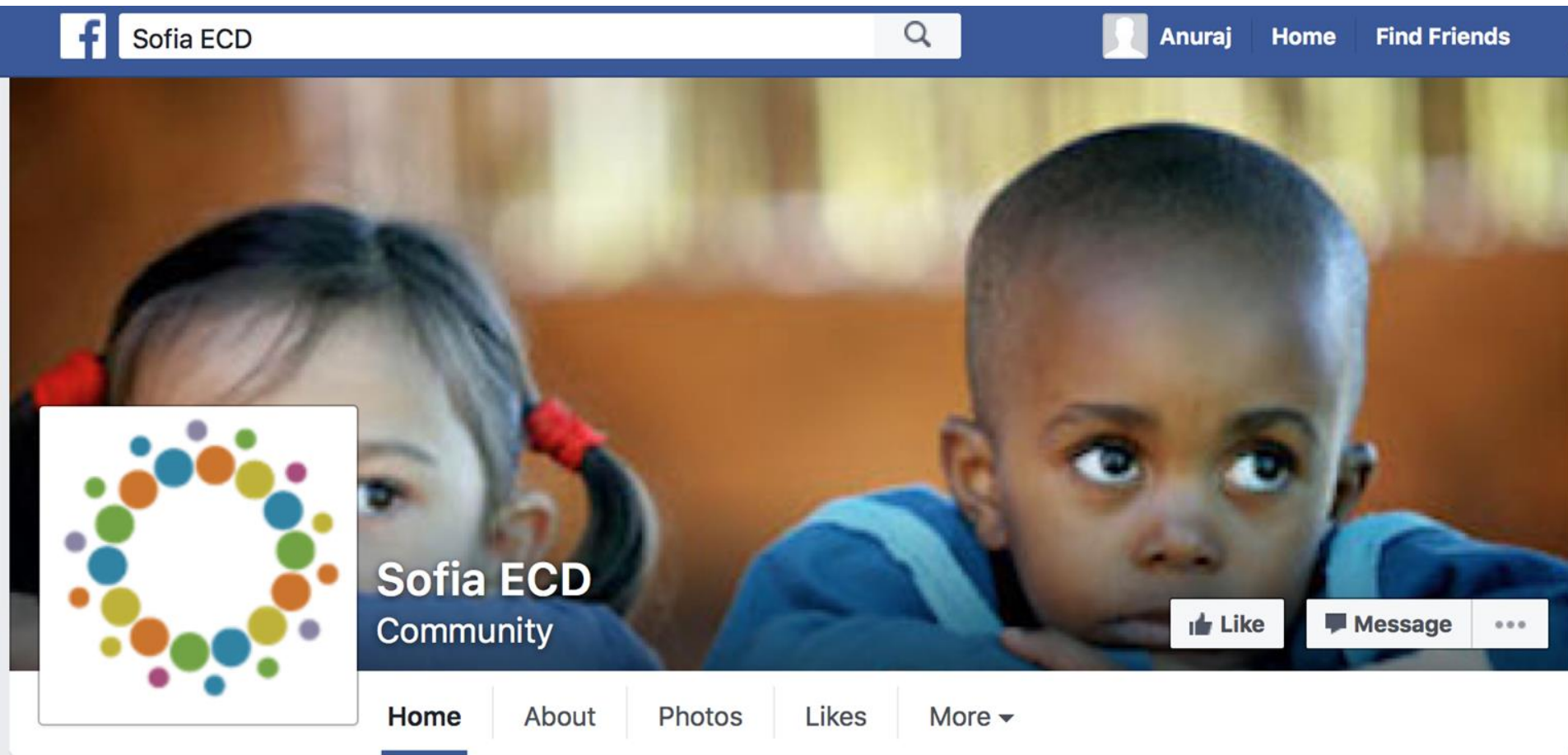
✓ PCV 1

[Record Rota 1 - due 12/12](#)

10 Weeks

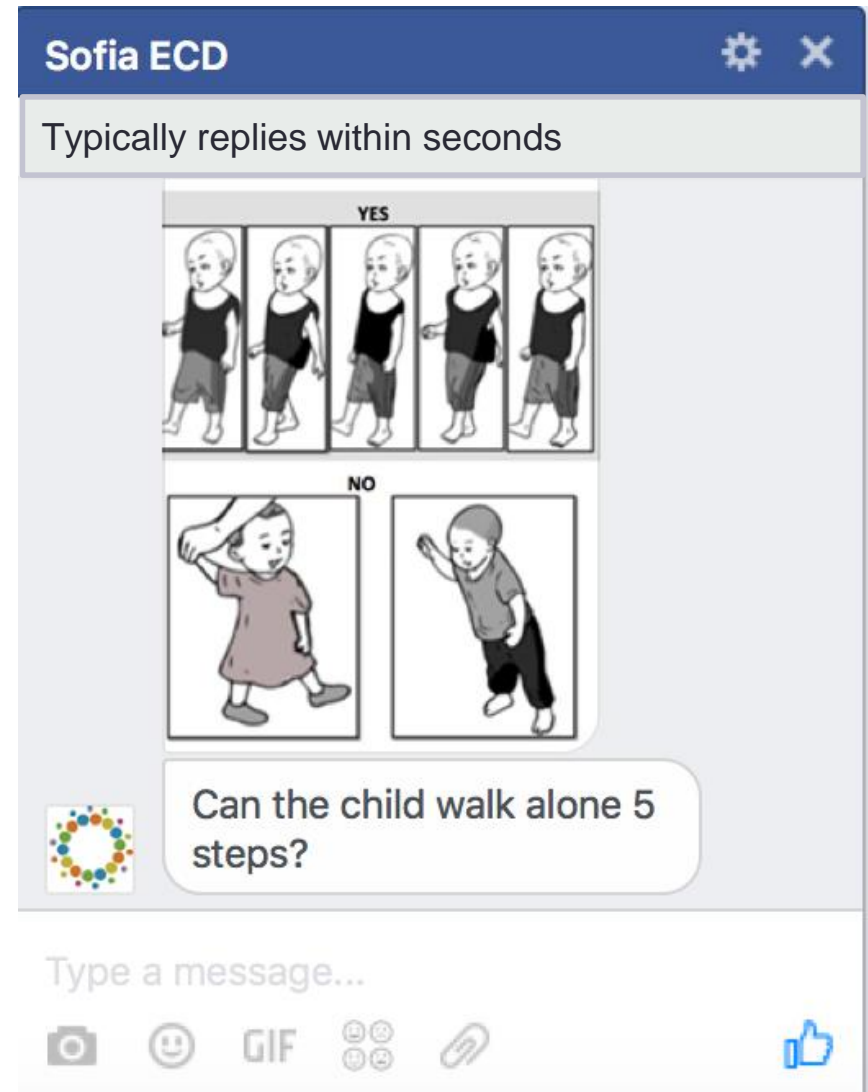
[Record OPV 2](#)[Record Penta 2](#)[Record PCV 2](#)

Sofia integrates with social media as an ECD assistant



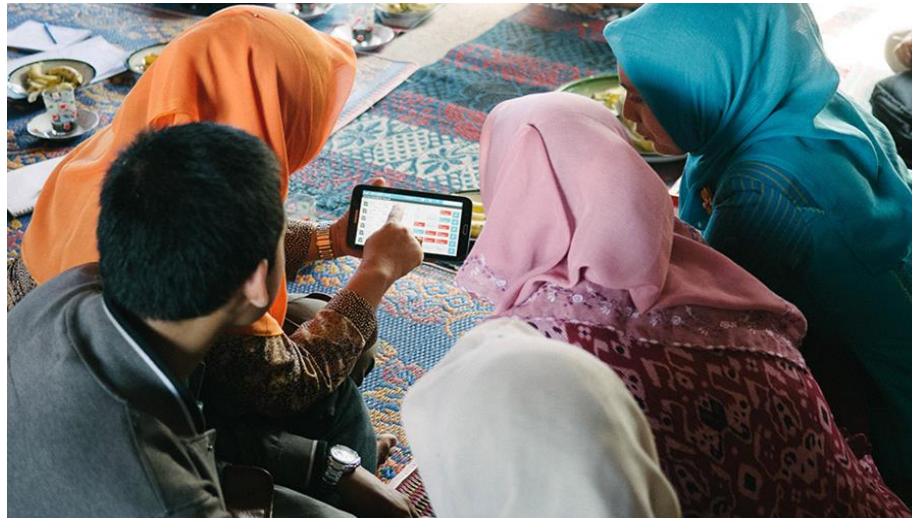


- Artificial Intelligence (AI) driven chat bot
- Accessed by friending Sofia on Facebook
- Provides evidence-based real-time assessment and advice
- Big data approach to assisting ECD interventions

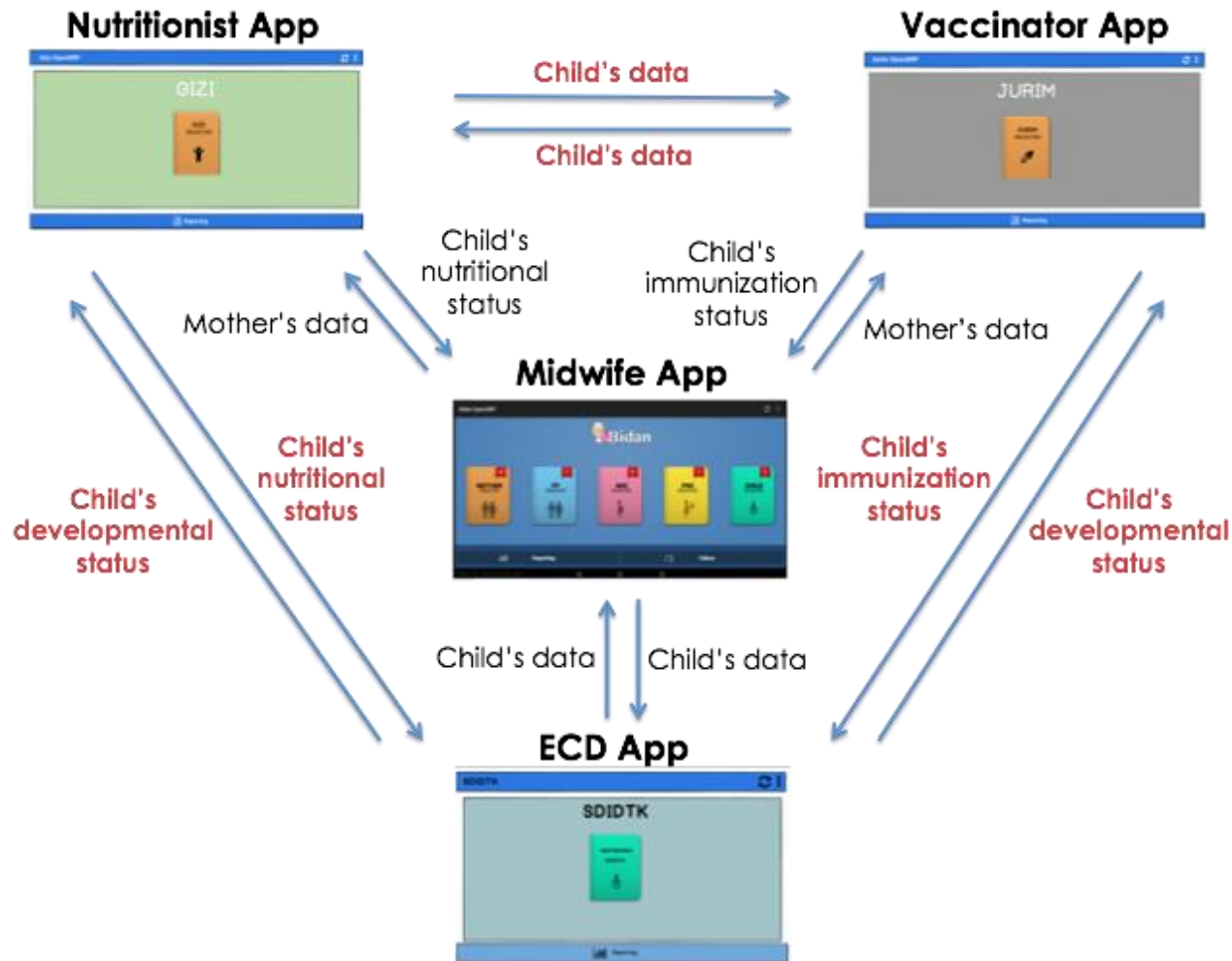


Indonesia OpenSRP Site

- 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



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**

FHWs	Similar Identity Data Collected	Similar Data Collected Across FHWs	Unique Data Collected each FHWs
Midwife	<ul style="list-style-type: none"> • Mother's Name • Mother's Birthday • Child's Name • Child's Birthday • Village 	<ul style="list-style-type: none"> • Child's Nutritional Status • Child's Immunization Checklist 	<ul style="list-style-type: none"> • Mother's Antenatal and Postnatal Care visit • Neonatal and Child Care visit
Nutritionist	<ul style="list-style-type: none"> • Mother's Name • Child's Name • Child's Birthday • Village 	<ul style="list-style-type: none"> • Child's Nutritional Status 	<ul style="list-style-type: none"> • Child's Nutritional Status
Vaccinator	<ul style="list-style-type: none"> • Mother's Name • Child's Name • Child's Birthday • Village 	<ul style="list-style-type: none"> • Child's Immunization Checklist 	<ul style="list-style-type: none"> • Child's Immunization Checklist
ECD Worker	<ul style="list-style-type: none"> • Mother's Name • Child's Name • Child's Birthday • Village 	<ul style="list-style-type: none"> • Child's Growth Faltering <ul style="list-style-type: none"> • Child's Weight • Child's Height • Child's Head Circumference 	<ul style="list-style-type: none"> • Child's developmental delay (milestones, vision, hearing) • Child's Mental-emotional delay (socio-emotional behavior problems, autism and ADHD)

Midwife's data

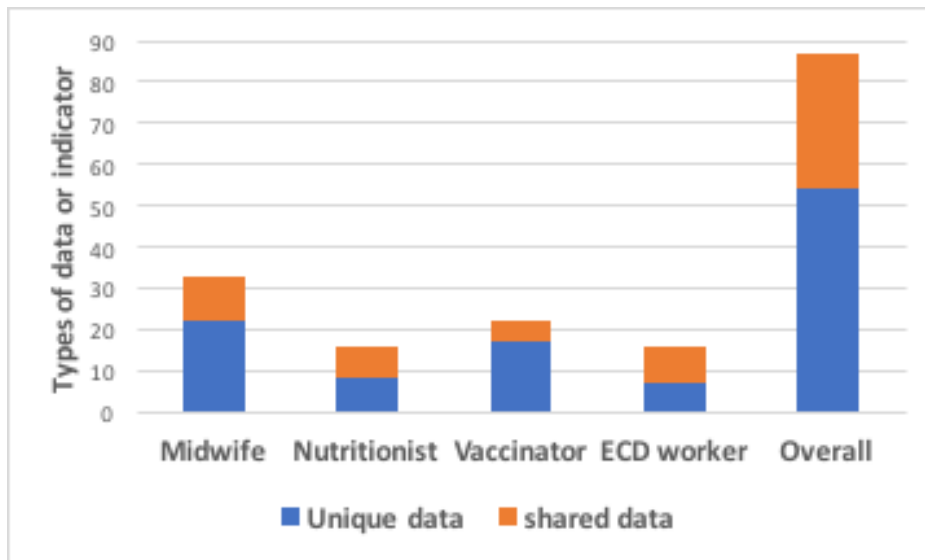
FHWs	Identity Data Collected	Data Collected	Similar Data Collected Across FHWs
Bidan	<ul style="list-style-type: none"> • Registration Date • Mother's Name • Father's Name • Village • Child's ID No. • Child's Name • Birthday • Gender • Maternal and Child Health booklet ownership (pink book) 	<ul style="list-style-type: none"> • 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) 	<ul style="list-style-type: none"> • 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

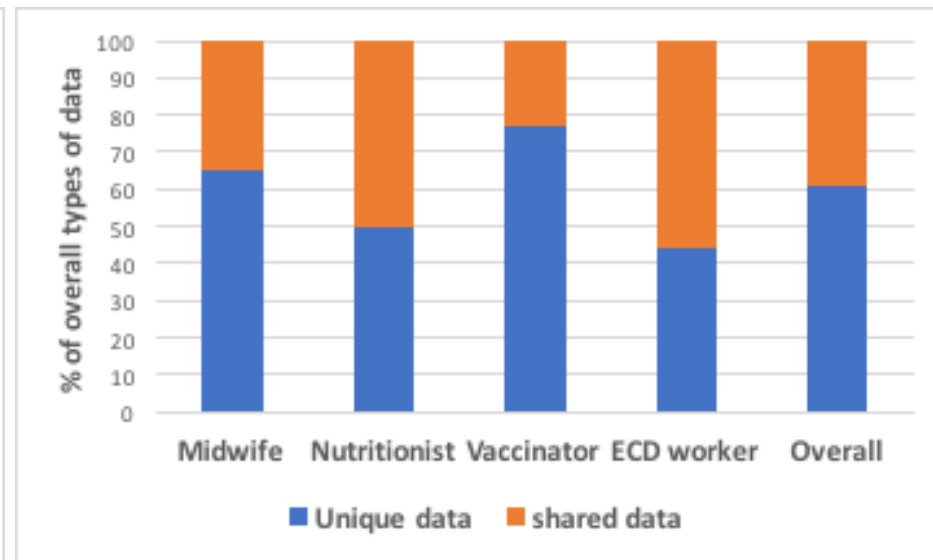
FHWs	Identity Data Collected	Data Collected	Similar Data Collected Across FHWs
Vaccinator	<ul style="list-style-type: none"> ● Child's No. in sub-village book ● Child's Name ● Mother's Name ● Child's Gender ● Birthday 	<ul style="list-style-type: none"> ● Camp name ● Camp Location (Village) ● Reference day of Camp ● Date of Camp ● Child's immunization checklist <ul style="list-style-type: none"> ○ 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 	<ul style="list-style-type: none"> ● 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

Number of Indicators by Worker Type

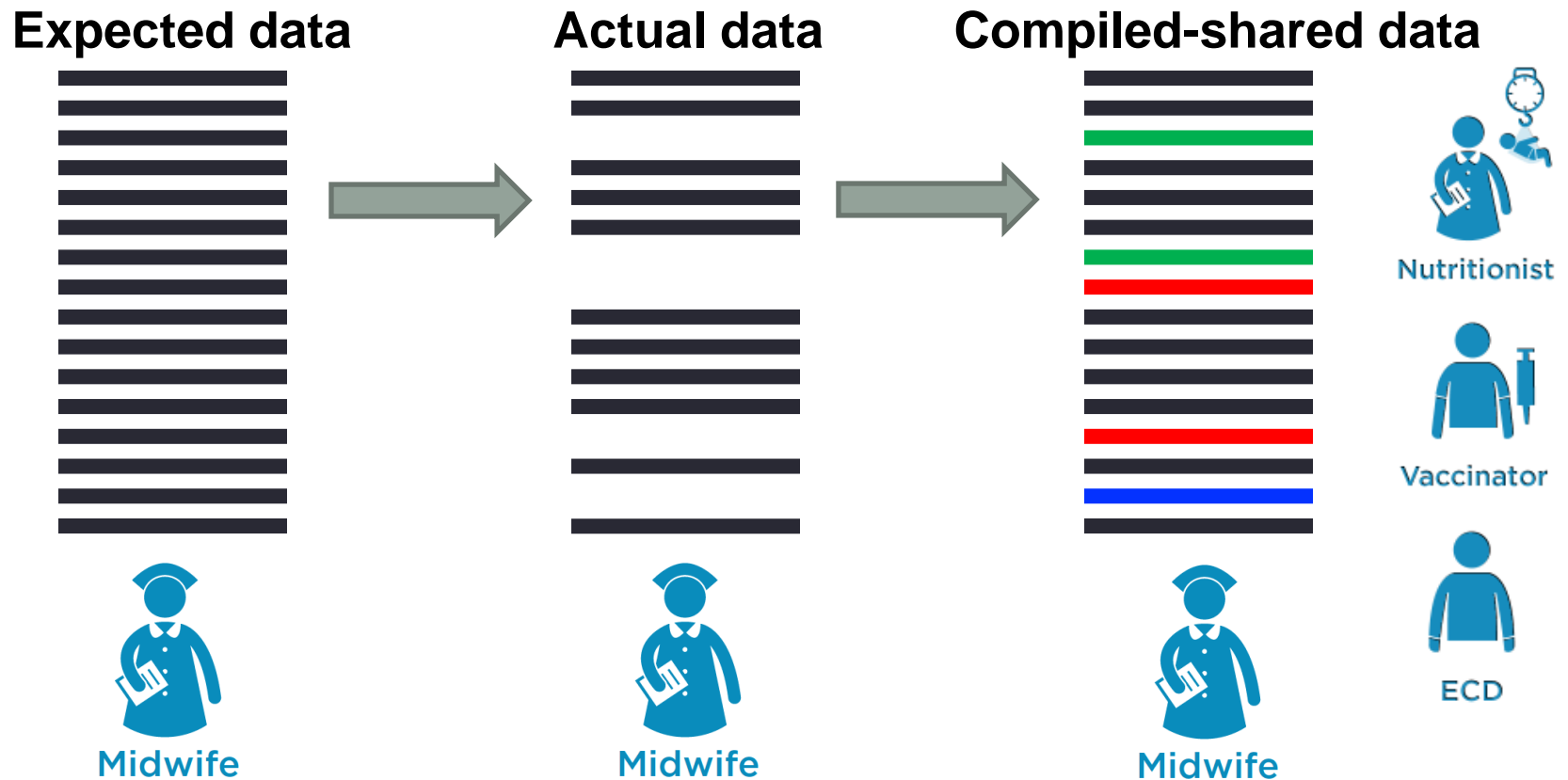


Proportion of Indicators by Worker Type



Overall approximately 40% of information requires duplication

Advantage of shared data records: fragmentation to completion



Coordinated and Networked Care: "More than the sum of its parts"

Healthy Pregnancy

Safe Birth

Predictive analytics to guide front line workers



Bot assisted self check for health and danger signs of pregnancy



ANC services and decision support, e.g. birth planning



Enhanced checkups and counseling using shared data

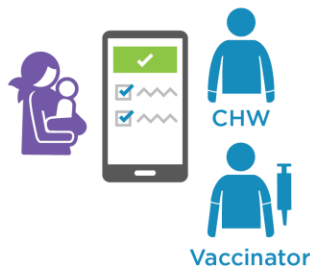


Facial recognition and out-of-area search tracks mother and transfers her data between workers, helps ensure safe delivery



Child Health

PNC checklist with mother and child visits, and vaccination follow-up already scheduled



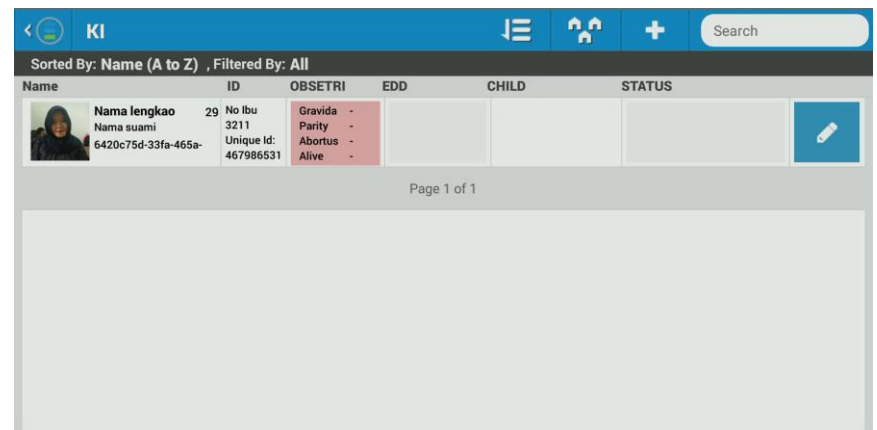
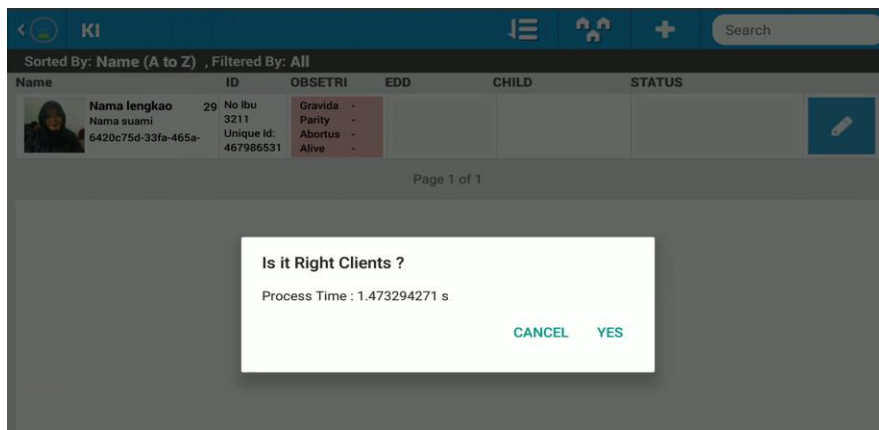
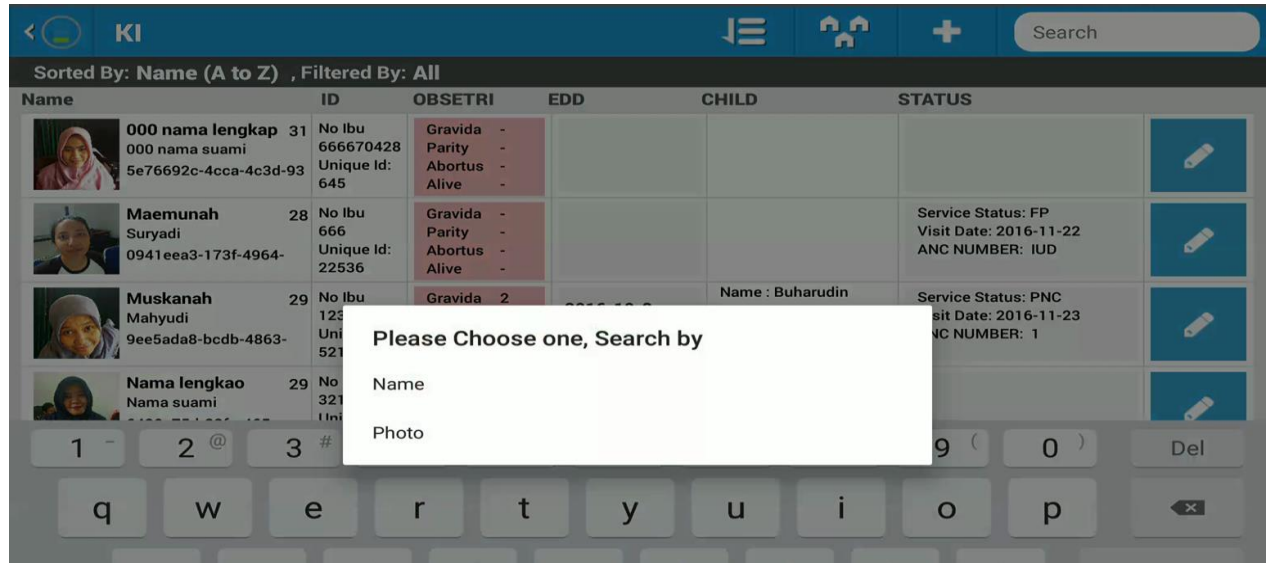
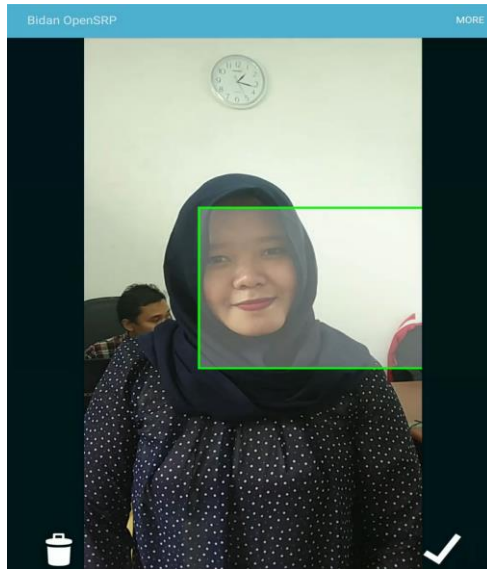
Encouragement and performance feedback



Data sharing enables child to receive timely immunization and nutrition and early childhood development assessments

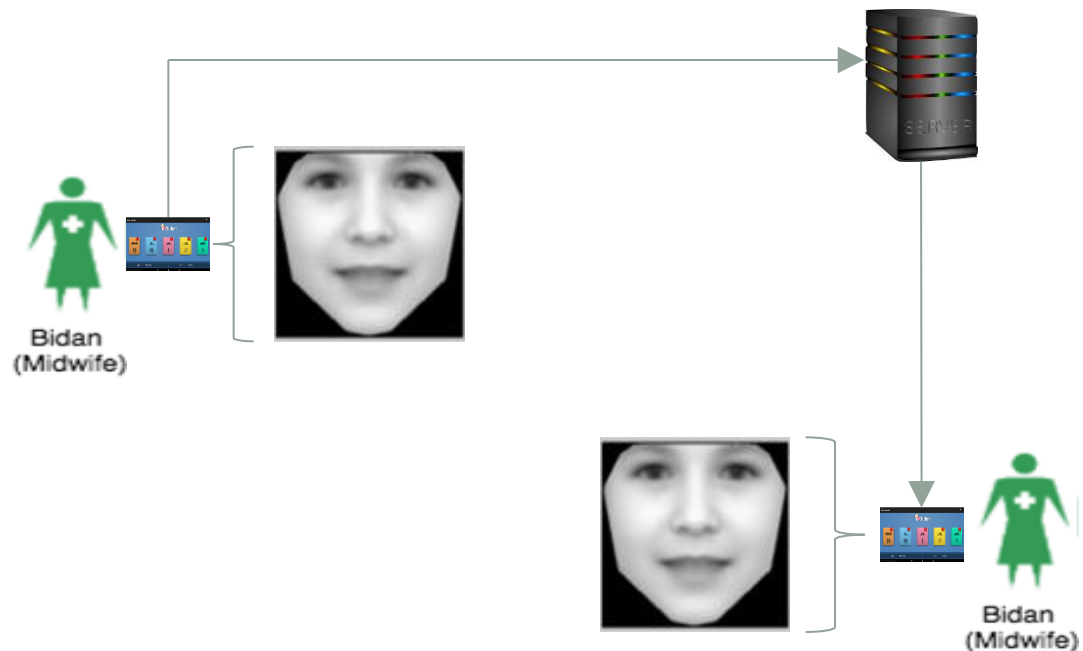


Facial recognition



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



DHO REPORT

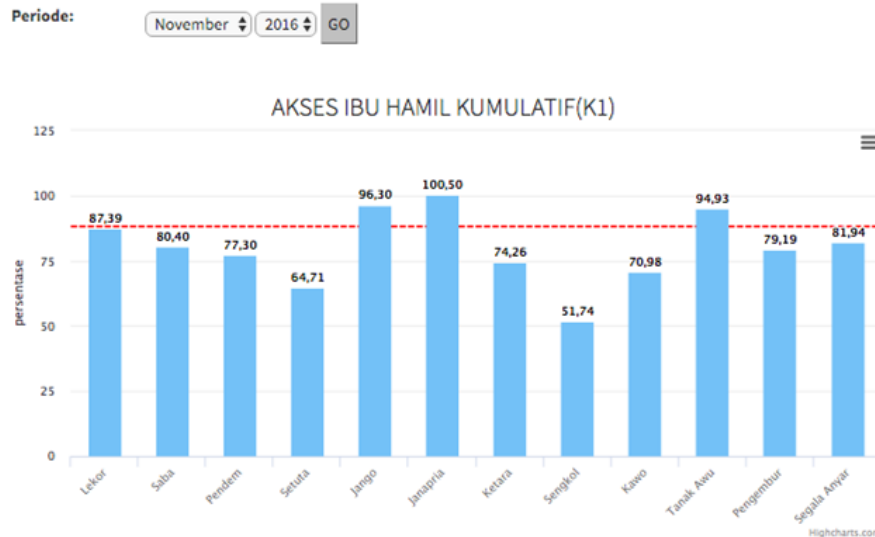
DINAS KESEHATAN LOMBOK TENGAH

ADMIN DEMO | LOGOUT

[HOMEPAGE](#)[REKAPITULASI DATA ENTRY](#)[LAPORAN](#)[HHH SCORE](#)

MENU LAPORAN

CAKUPAN INDIKATOR PWS



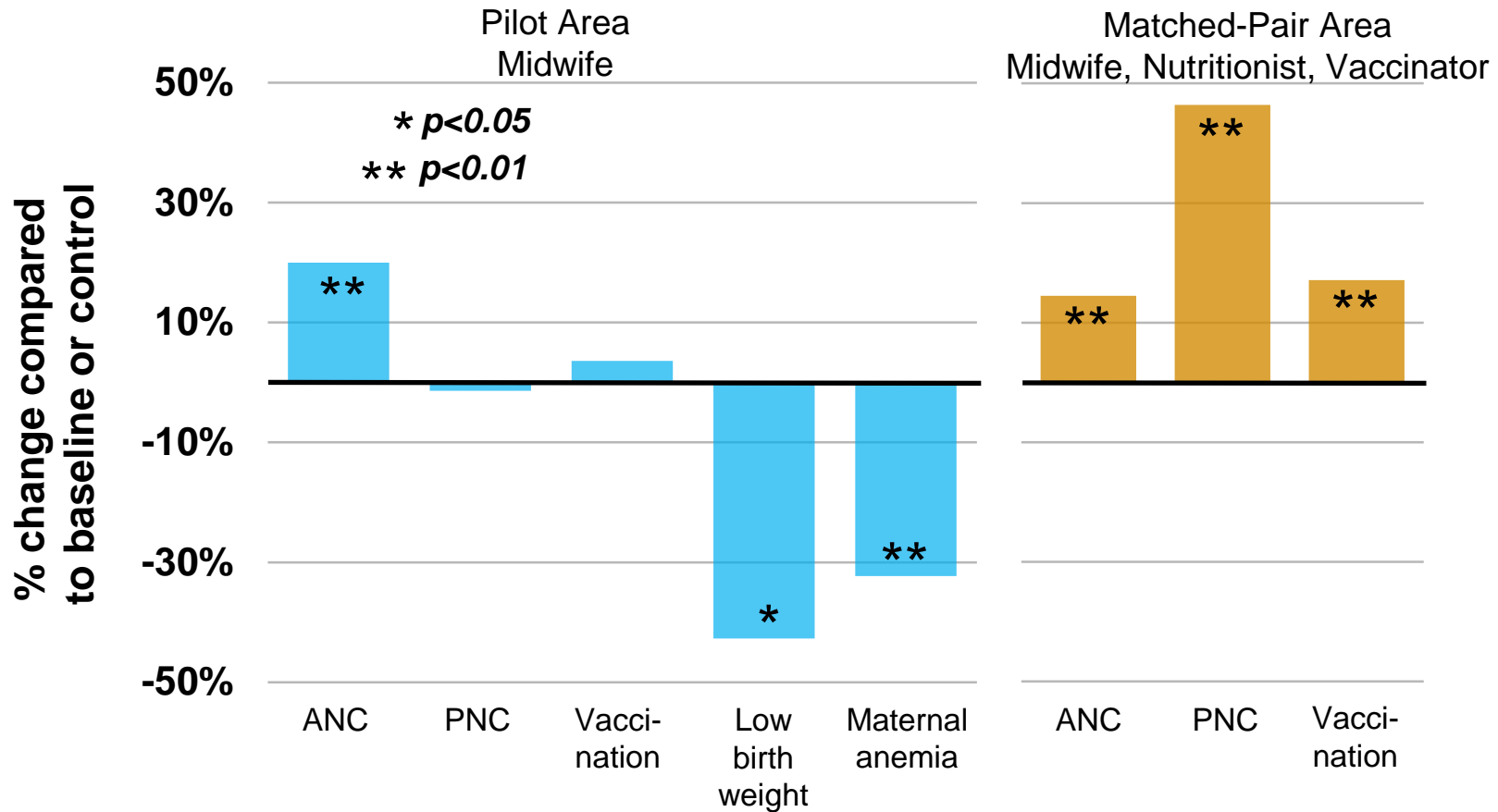
Supervisors and senior officers can review progress in real time.

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

Demonstrated Impact



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

A group of 12 young adults, mostly wearing hijabs, are posing for a photo in a forest. They are standing in front of a very large, thick tree trunk. The group is arranged in two rows, with some people sitting or kneeling in the front and others standing behind them. They are all smiling and looking towards the camera. The background shows more trees and a slightly hazy atmosphere.

Thank you!