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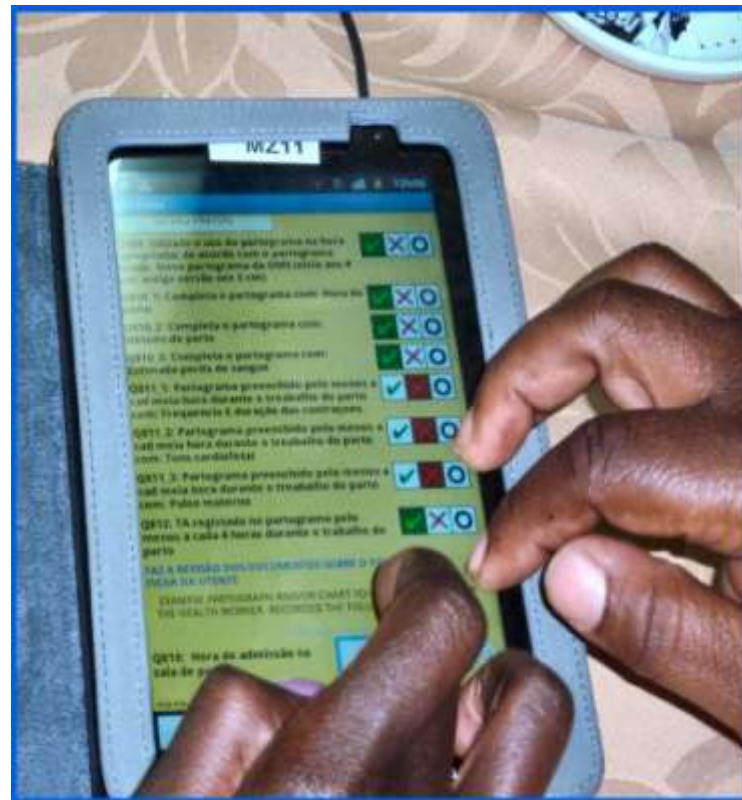


Maternal and Child Health
Integrated Program



Mobile to Web

An integrated model for
mobile data collection,
training, web-based
fieldwork monitoring and
Results Reporting



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Context



- MCHIP is **USAID**/Global Health's Flagship Project for Maternal & Child Health. \$500 Million ceiling over 5 years with 30 country offices.
- ICF (formerly ICF Macro) is one of several sub-contractors to Jhpiego in implementing the 5 year MCHIP project
- The Quality of Care (QoC) assessments have been an ongoing multi-country activity of MCHIP, using mobile devices for data collection, field transmission of data to a server with data quality and results reporting via a web portal



Rationale



- **Skilled birth attendance has risen in many developing countries, but maternal mortality has often remained relatively stagnant**
- **The type and quality of care provided by skilled birth attendants is not well understood--both:**
 - **essential maternal and newborn care, and**
 - **management of maternal and newborn complications at the time of birth**
- **Information on MNC QoC is needed to inform policy change, resource allocation and program planning.**



Quality of Care (QoC) Objectives



- Guide quality improvement activities for maternal and newborn care at facility, regional and national levels.
- Provide baseline estimates for countries to monitor improvements in care.
- Develop indicators and data collection tools that can be used in multiple countries.
- Implement an M&E reporting system with a rapid, high quality results turnaround



Quality of Care (QoC) Health Facility Assessments



- Implemented in 7 countries plus Zanzibar in 2009-2012
- Assessment in Zimbabwe recently completed (March 2012)
- Data from over 3,700 deliveries, close to 4,000 ANC consults, and over 1,200 health worker interviews
- Observational & survey assessment tools for Labor & Delivery, Antenatal Care, Knowledge and Inventories



Mobile to Web: Requirements & Features



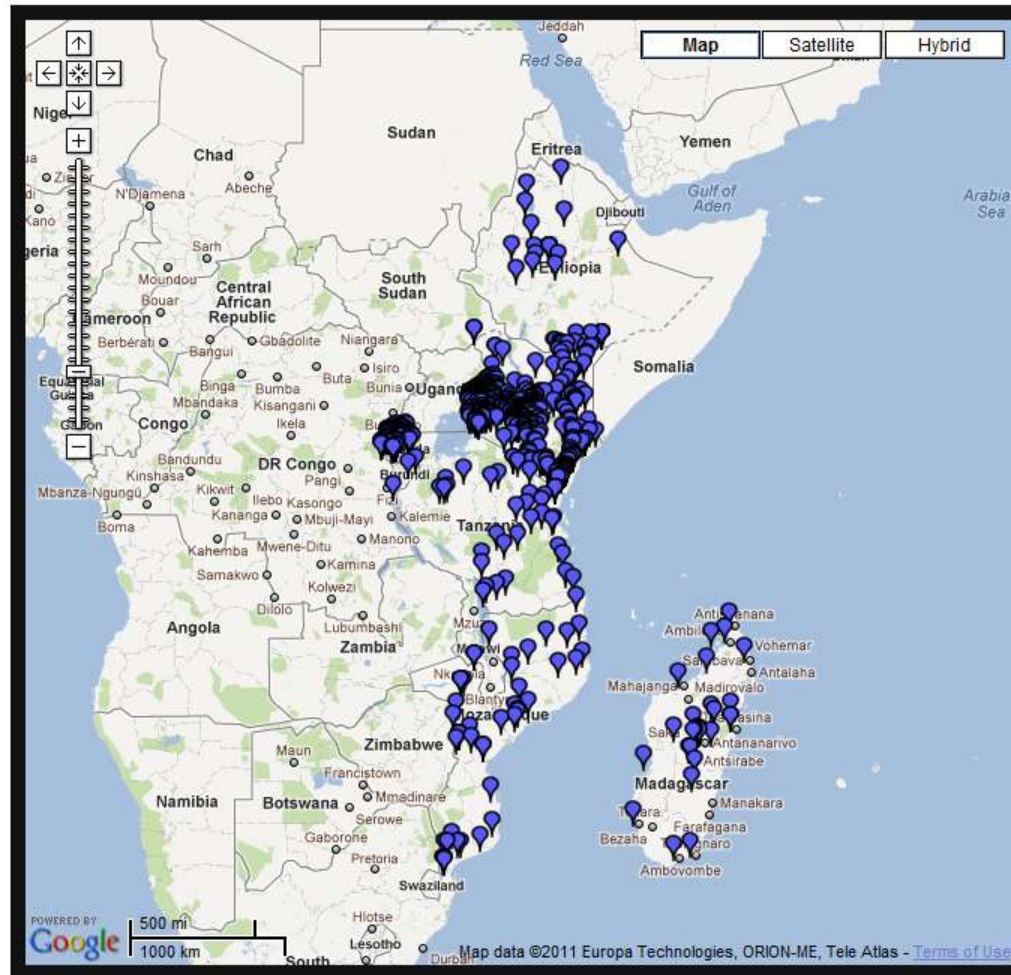
- An off-the-shelf, inexpensive, multi-platform development environment, easily customizable
- Data collection training and implementation utilizing mobile devices, smart phones & tablets
- Real-time web-based field Data Monitoring with 2-way data communication
- In-country and/or Cloud based servers, dashboards, SMS and Skype for communicating with supervisors & enumerators
- Results Reporting through online web tables



Sampled Facilities



QoC Facility Locations



The QoC-MNC Actors

- **Observers:**
 - Doctors
 - Nurses
 - Midwives
- **Health Care Providers:**
 - Labor and Delivery providers
 - Antenatal Care providers
- **Clients:**
 - Pregnant Women
 - Mothers
 - Newborns



Data collection using Mobile Smart Phones



- Observers used touch screen HTC Windows Mobile Smart Phones or Samsung Galaxy Android Tablets for data entry



Mobile to Web Data Flow

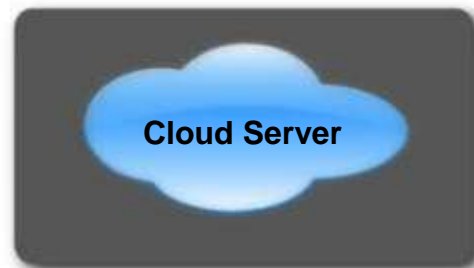
1.



Data Collection/
Direct
Observation of
HW
Performance



Recorded on
Smart Phones
or Tablets



Transmitted to Cloud
Server for large
deployments



Piped to Web Server/Database with
predefined Data Monitoring/Data
Analysis Templates



Working Tabulations for MCHIP GoC Health Facility Assessments

Report: Health Facility Assessments - Selection: Facility Information

Sort by Facility

Facility Name	Facility ID	Facility Type	Year	Assessment	Score	Overall Score	Overall Score (Max)	Overall Score (%)	Overall Score (Min)	Overall Score (Max)	Overall Score (Min)	Overall Score (%)
11-10-1001	10101	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1002	10102	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1003	10103	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1004	10104	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1005	10105	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1006	10106	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1007	10107	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1008	10108	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1009	10109	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1010	10110	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1011	10111	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1012	10112	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1013	10113	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1014	10114	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1015	10115	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1016	10116	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1017	10117	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1018	10118	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1019	10119	Urban Health Center	2010	1	1	1	1	100	0	1	0	100
11-10-1020	10120	Urban Health Center	2010	1	1	1	1	100	0	1	0	100



Mobile to Web Data Flow

1.



Data Collection/
Direct
Observation of
HW Performance



- Training observers with checklists using simulations of normal births and potential L&D complications (NBR, PPH, PE/E)
- Mobile devices also used to score trainees on accuracy of observations (against gold standard)
- Observers had to look at Tablet, HW and client





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Maternal and Child Health
Integrated Program

PPH

Client Name: []

PPH Observation Form

CHECKLIST FOR MANAGEMENT OF POSTPARTUM HEMORRHAGE

Q901: State time of complication (time on 24 hour clock) 15:47

RECORD WHETHER THE HEALTH WORKER CARRIED OUT THE FOLLOWING STEPS AND/OR EXAMINATIONS:
(SOME OF THE FOLLOWING STEPS MAY HAVE BEEN PERFORMED BEFORE, OTHERS MAY BE DONE SIMULTANEOUSLY OR BY MORE THAN ONE PROVIDER)

IMMEDIATE CARE

Q903A: Was bleeding monitored?

Q904: Uterine massage performed?

Q905: Was oxytocin given?

Q906: Was another uterotonic given?

Q906T: Record time other uterotonic given

Q907: Was there an abdominal exam done for uterine consistency and massage?

Q908: Did the health workers examine the vagina and perineum for lacerations?

Q909: Did the health worker examine the placenta for completeness?

Q910: Were IV fluids started?

FOLLOW-UP CARE

Q911: Was a uterine exploration performed?

Q911T: Time performed

Q912: Was a uterine mechanical evacuation performed?

Q913: Was a manual removal of the placenta performed?

Q913T: Time performed

Q914: Was a bimanual compression of the uterus performed?

Q915: Was aortic compression performed?

Q915T: Time performed

Q916: Were clotting studies performed?

Q917: Was hemoglobin/hemocrit checked?

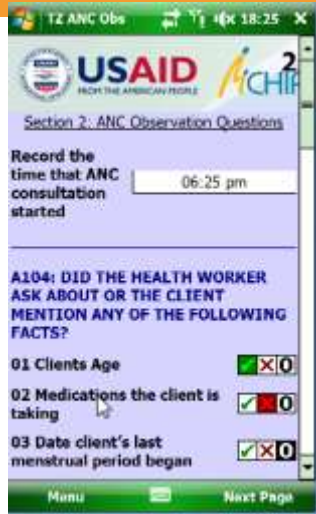


Mobile to Web Data Flow

2.



Recorded on
Smart Phones
or Tablets



TZ ANC Obs 18:25

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Section 2: ANC Observation Questions

Record the time that ANC consultation started 06:25 pm


A104: DID THE HEALTH WORKER ASK ABOUT OR THE CLIENT MENTION ANY OF THE FOLLOWING FACTS?

01 Clients Age

02 Medications the client is taking

03 Date client's last menstrual period began

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TZ L&D 21:26

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TANZANIA & ZANZIBAR

Questionnaire 5: Observation of Routine & Complicated Deliveries

Select Facility

Facility Number

Facility Type

Latitude

(Tap to Update GPS Coordinates)

Longitude

(Tap to Update GPS Coordinates)

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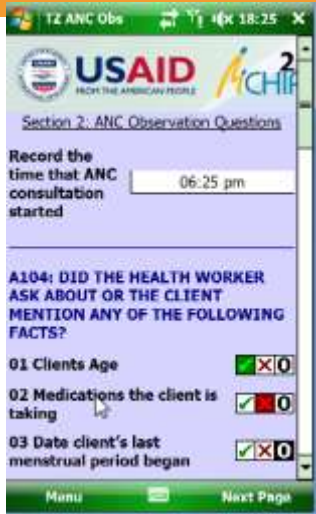
- Smart phones and Android Tablets used for data entry
- Mobile Data Studio (MDS) software runs on Win Mobile, Android & iOS platforms
- Handles complicated logic and branching
- Cost per device is ~ US \$15 per month of fieldwork (includes server storage)
- Develop tools on PC and deploy to devices via USB or TCP/IP

Mobile to Web Data Flow

2.



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Section 2: ANC Observation Questions

Record the time that ANC consultation started 06:25 pm

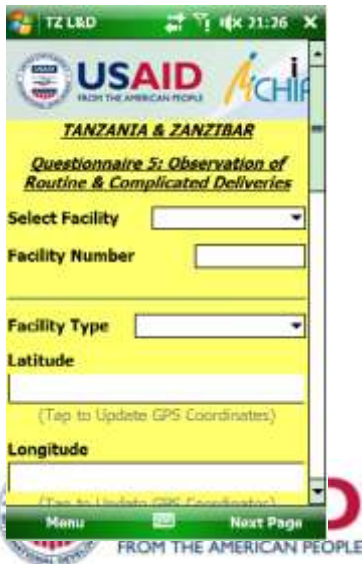
A104: DID THE HEALTH WORKER ASK ABOUT OR THE CLIENT MENTION ANY OF THE FOLLOWING FACTS?

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(Tap to Update GPS Coordinates)

Longitude

(Tap to Update GPS Coordinates)

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- Observational tools

- Events do not follow a prescribed path – many skips and branching
- Events do not occur in a set order
- “Floating” links for branching to complications
- Tablets appear to be optimal devices for these kinds of assessments due to larger screen

Mobile to Web Data Flow

- Mobile Devices configured to transmit collected data to in-country or cloud server after backup

- 2-way communication dispatches updates to entry tools between mobile device and server

- Zimbabwe HFA utilized 60 mobile devices with SIM and SD cards

- Cloud server control panel coordinates receiving data and pushing program updates down to mobile devices upon connecting

- Data can be exported as Excel, Access, XML, HTML, SQL Server

3.



Transmitted to Cloud Server for large deployments

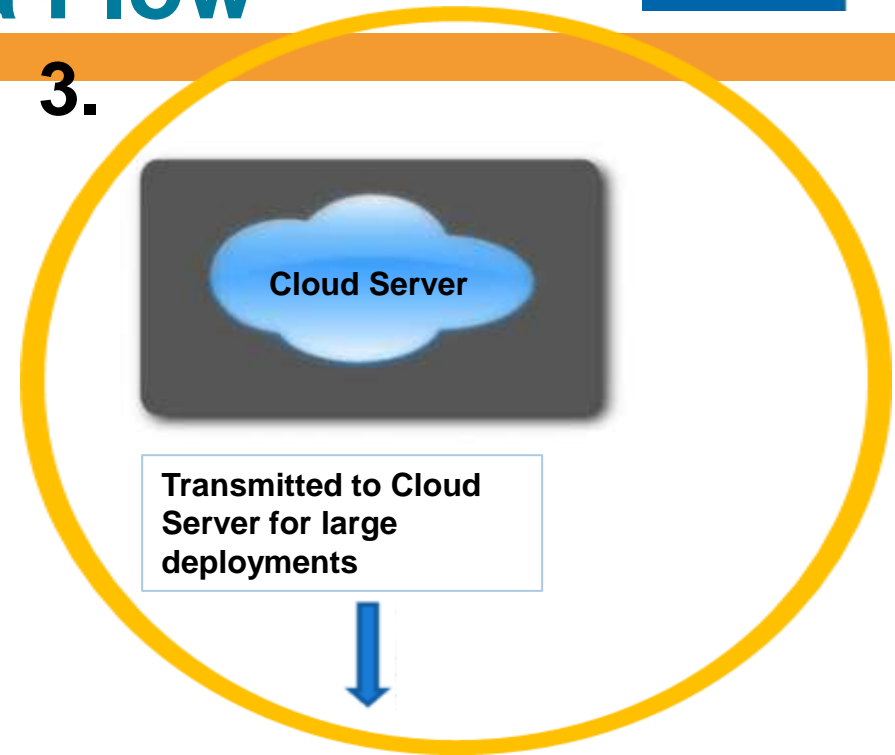


Mobile to Web Data Flow

3.

Mobile Collection was not without problems Including:

- Mobile Handset Hardware Issues
- Theft
- Connectivity/Updating Issues
- Observer/ Enumerator Issues
- Updating Program Bugs
- Server Down Time



Mobile to Web Data Flow



Data Collection/Direct Observation of Health Worker Performance



Recorded on Smart Phones or Tablets



Transmitted to Cloud Server for large deployments



4.



Working Tabulations for MCHIP GoC Health Facility Assessments

Report: Health Facility Assessments

Summary: Facility Assessments

View by Facility

Facility Name	Year	Facility Type	Site	Assessment Type	Assessment Score	Assessment Status	Assessment Date	Assessment User	Assessment Location	Assessment Status	Assessment Score	Assessment Status	Assessment Score	Assessment Status	Assessment Score	Assessment Status	Assessment Score	Assessment Status
101-101-101	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-102	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-103	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-104	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-105	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-106	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-107	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-108	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-109	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
101-101-110	2014	Health Center	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Piped to Web Server/Database with predefined Data Monitoring/Data Analysis Templates



Mobile to Web Data Flow

- Web Server and SQL Server database allow remote monitoring of incoming data during fieldwork
- Predefined templates for survey data monitoring
- Predefined templates for analysis of web tables
- Remote access to results with capabilities of getting messages back to field data collectors

4.



Facility Name	Facility ID	Facility Type	Year	Level	Assessment Type	Assessment Score	Assessment Status	Assessment Date	Assessment User	Assessment Location
101-001	101-001	Health Center	2014	1	Assessment	85	Pass	10/15/14	John Doe	USAID
101-002	101-002	Health Center	2014	1	Assessment	78	Fail	10/15/14	John Doe	USAID
101-003	101-003	Health Center	2014	1	Assessment	92	Pass	10/15/14	John Doe	USAID
101-004	101-004	Health Center	2014	1	Assessment	88	Pass	10/15/14	John Doe	USAID
101-005	101-005	Health Center	2014	1	Assessment	75	Fail	10/15/14	John Doe	USAID
101-006	101-006	Health Center	2014	1	Assessment	82	Pass	10/15/14	John Doe	USAID
101-007	101-007	Health Center	2014	1	Assessment	79	Fail	10/15/14	John Doe	USAID
101-008	101-008	Health Center	2014	1	Assessment	86	Pass	10/15/14	John Doe	USAID
101-009	101-009	Health Center	2014	1	Assessment	81	Pass	10/15/14	John Doe	USAID
101-010	101-010	Health Center	2014	1	Assessment	77	Fail	10/15/14	John Doe	USAID
101-011	101-011	Health Center	2014	1	Assessment	83	Pass	10/15/14	John Doe	USAID
101-012	101-012	Health Center	2014	1	Assessment	76	Fail	10/15/14	John Doe	USAID
101-013	101-013	Health Center	2014	1	Assessment	84	Pass	10/15/14	John Doe	USAID
101-014	101-014	Health Center	2014	1	Assessment	79	Fail	10/15/14	John Doe	USAID
101-015	101-015	Health Center	2014	1	Assessment	87	Pass	10/15/14	John Doe	USAID
101-016	101-016	Health Center	2014	1	Assessment	78	Fail	10/15/14	John Doe	USAID
101-017	101-017	Health Center	2014	1	Assessment	85	Pass	10/15/14	John Doe	USAID
101-018	101-018	Health Center	2014	1	Assessment	76	Fail	10/15/14	John Doe	USAID
101-019	101-019	Health Center	2014	1	Assessment	82	Pass	10/15/14	John Doe	USAID
101-020	101-020	Health Center	2014	1	Assessment	77	Fail	10/15/14	John Doe	USAID

Piped to Web Server/Database with predefined Data Monitoring/Data Analysis Templates

Monitoring Data Quality: Facility Level



Select Country: Select Item:

Status by Facility



























Facility Name	Facility ID	Facility Type	Team	Days Observing	Expected Deliveries per (2or3) days	Actual Deliveries per (2or3) days	Percent Actual Expected	Weight Value	Inv L&D	ANC	Inv ANC	HWIK
CS 1\$ de Malo	201018	Urban Health Center	3	2	8	4	50%	2.00	1	5	0	3
CS 1\$ Junho	201122	Urban Health Center	4	2	14	17	121%	0.82	1	10	1	6
CS 25 Setembro	201105	Urban Health Center	1	2	16	26	163%	0.62	1	10	1	1
CS Bagamoio	201222	Urban Health Center	4	2	12	12	100%	1.00	1	9	1	3
CS Balama	201303	Rural Health Center	1	3	9	6	67%	1.00	1	9	1	4
CS Chiure	201203	Rural Health Center	1	2	6	8	133%	0.75	1	8	1	4
CS Coalane	201308	Urban Health Center	2	2	10	5	50%	2.00	1	8	1	4
CS Gorongosa	201315	Rural Health Center	3	2	10	7	70%	1.43	1	9	1	4
CS Guro-Sede	201311	Rural Health Center	3	3	9	8	89%	0.75	0	9	1	4
CS Inhassunge	201409	Rural Health Center	2	3	8	6	75%	0.89	1	4	1	5
CS Licuare	201408	Urban Health Center	2	3	11	25	227%	0.29	1	4	1	1
CS Lifitzi	201309	Rural Health Center	2	3	12	10	83%	0.80	1	9	1	1
CS Lugela	201407	Urban Health Center	2	2	4	5	125%	0.80	1	13	1	2
CS Machava II	201121	Urban Health Center	4	2	10	10	100%	1.00	1	9	1	5
CS Macia	201119	Rural Health Center	4	2	7	6	86%	1.17	1	8	1	5
CS Macurungo	201021	Urban Health Center	3	2	4	5	125%	0.80	1	8	1	3
CS Matola II	201029	Urban Health Center	4	3	20	10	50%	1.33	1	10	1	6
CS Maua	201301	Rural Health Center	1	3	6	8	133%	0.50	1	8	1	3
CS Moatize	201110	Urban Health Center	2	2	8	13	163%	0.62	1	9	1	3
CS Mocimboa da Praia	201102	Provincial Hospital	1	2	7	4	57%	1.75	1	3	1	4
CS Munhava	201415	Rural Health Center	3	2	17	12	71%	1.42	1	8	1	4



Monitoring Data Quality : Case Level



Facility Deliveries Detail -- CS Moatize

Contact Interviewer	Finished (system)	Client Name (delivery)	Obsever Name	Unit ID	Team	Sec. 1 Result	Sec. 2 Result	Sec. 3 Result	Sec. 7 Result	Sec. 8 Result	PPH	PPE	NBR	Interview Start	Interview End	Interview (mins)
 	2011-11-09 10:47:03.0	Anatercia	Enora	MZ10	2	1	1	1	1	1	no	no	yes			
 	2011-11-07 11:46:16.0	Celma	Otjlia	MZ10	2	1	1	1	1	1	no	no	no	16:16	21:17	301
 	2011-11-07 11:45:27.0	Suraya	Otjlia	MZ10	2	1	1	1	1	1	no	no	no	08:40	18:46	606
 	2011-11-06 22:08:15.0	Natália	Otjlia	MZ10	2	1	1	1	1	1	yes	no	no	16:31	21:43	312
 	2011-11-06 22:07:25.0	Cristina	Otjlia	MZ10	2	1	1	1	1	1	no	no	no	08:45	21:32	767
 	2011-11-06 20:07:02.0	zita viano	Luisa	MZ11	2	1	1	1	1	1	no	no	no	16:33	20:06	213
 	2011-11-05 21:19:48.0	Gracinha	Otjlia	MZ10	2	1	1	0	0		no	no	no			
 	2011-11-05 18:09:25.0	Zinha	Otjlia	MZ10	2	1	1	1	1	1	no	no	no	15:38	15:46	8
 	2011-11-05 16:04:17.0	Clara	Enora	MZ11	2	1	1	1	1	1	no	no	no	08:09	12:08	239
 	2011-11-05 12:46:16.0	Maria	Enora	MZ10	2	1	1	1	1	1	no	no	no			
 	2011-11-05 12:45:26.0	Manuela	Otjlia	MZ10	2	1	1	1	1	1	no	no	no	14:52	18:37	225
 	2011-11-04 08:41:48.0	rosa mussa	Luisa	MZ11	2	1	1	1	1	1	no	no	no	07:40	08:38	58
 	2011-10-26 10:08:31.0	Perceverance	Zaniba	MZ07	2	0		1	1	1	no	no	no	09:52	10:01	9

Results Reporting: Table Listing

Mozambique

Select Country: Select Item:

Tool Number	Table Code	Table Title	Admin
5	5.1	Table 5.1. Description of observed L&D sessions	Edit
5	5.1a	Table 5.1a Description of observed L&D sessions from chart review	Edit
5	5.2	Table 5.2. Description of facility characteristics where L&D observations occurred	Edit
5	5.3	Table 5.3. Essential obstetric practices during labor and delivery	Edit
5	5.4	Table 5.4. Woman friendly care	Edit
5	5.5	Table 5.5. Infection prevention during labor and delivery	Edit
5	5.5a	Table 5.5a Antibiotics usage	Edit
5	5.6	Table 5.6. Screening for pre-eclampsia during labor and delivery	Edit
5	5.7	Table 5.7. Partograph usage	Edit
5	5.8	Table 5.8. Uterotonic usage and AMTSL	Edit
5	5.9	Table 5.9. Immediate and essential newborn care	Edit
5	5.10	Table 5.10. Non-beneficial and un-indicated practices	Edit
5	5.11	Table 5.11. Description of newborn resuscitation cases	Edit
5	5.12	Table 5.12. Newborn resuscitation complicated case descriptions	Edit
5	5.13	Table 5.13. Description of pre-eclampsia/eclampsia cases	Edit
5	5.14	Table 5.14. Pre-eclampsia/eclampsia profiles	Edit
5	5.15	Table 5.15. Description of postpartum hemorrhage cases	Edit
5	5.16	Table 5.16. Postpartum hemorrhage cases profiles	Edit
5	5.17	Table 5.17. Summary of L&D care	Edit

[Add Table](#)

Table 5.9: Immediate & Essential Newborn care



Mozambique All Facilities -- All Teams

NOTE: Preliminary data under review and no weightings applied

Select:

Table 5.9. Immediate and essential newborn

Immediate newborn care tasks (chart)	Percent of cases - unweighted	L&D cases (N)	Percent of cases - weighted
Immediately dries baby with towel	89.4%	455 / 509	90.1%
Discards wet towel	89.6%	455 / 508	89.8%
Covers baby with dry towel	93.7%	474 / 506	94.4%
Places newborn on the mother's abdomen "skin to skin"	42.7%	216 / 506	43.3%
If not placed skin to skin, wraps baby in dry towel	72.3%	211 / 292	71.5%
Ties/clamps cord when pulsations stop, or by 2-3min after birth (not immediately after birth)	72.5%	367 / 506	76.6%
Cuts cord with clean blade or clean scissors	98.0%	498 / 508	98.8%
Mother and baby put in same room "rooming in"	93.5%	475 / 508	92.7%
Checks baby's temp 15 min after birth	0.8%	4 / 507	0.9%
Check's baby's skin color 15 min after birth	4.7%	24 / 507	6.0%
Baby kept skin to skin for the first hour after birth	33.5%	170 / 508	35.9%
Breastfeeding initiated within the first hour after birth	19.3%	98 / 508	19.2%
Baby not bathed within the first hour after birth	97.2%	495 / 509	97.4%





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Thank You!

