BETTER IMMUNIZATION DATA INITIATIVE

TASK 3: LMIS – INTEGRATION AND INTEROPERABILITY SHORT COURSE

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BETTER IMMUNIZATION DATA INITIATIVE

Session objectives

1. Understand how an LMIS integrates with an immunization registry (the Tanzanian example)
2. Discuss the lessons learned from incorporating WHO Excel-based tools (DVDMT, SMT, CCIT)
3. Learn how DHIS2 and an LMIS can be the next generation interoperable tools for countries as part of an eHealth infrastructure

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Agenda

Welcome and introductions	14:00 – 14:15	15 min
Define a few terms	14:15 – 14:45	30 min
1. LMIS Integration with an Immunization Registry	14:45 – 15:15	30 min
Break	15:15 – 15:30	15 min
2. Lessons learned from incorporating WHO Excel-based tools	15:30 – 16:00	30 min
3. Interoperability scenarios of DHIS2 and an LMIS	16:00 – 16:30	30 min
Expectation and outcome review	16:30 – 17:00	30 min

DEFINE A FEW TERMS

Logistics Management Information System

"is a system of records and reports – whether paper based or electronic – used to aggregate, analyze, validate, and display data (from all levels of the logistics system) that can be used to make logistics decisions and manage the supply chain"

- Computerizing Logistics Management Information Systems: A Program Manager's Guide

System

A set of interacting parts forming a complex whole.

Information System

The set of people and computers gathering and interpreting data.

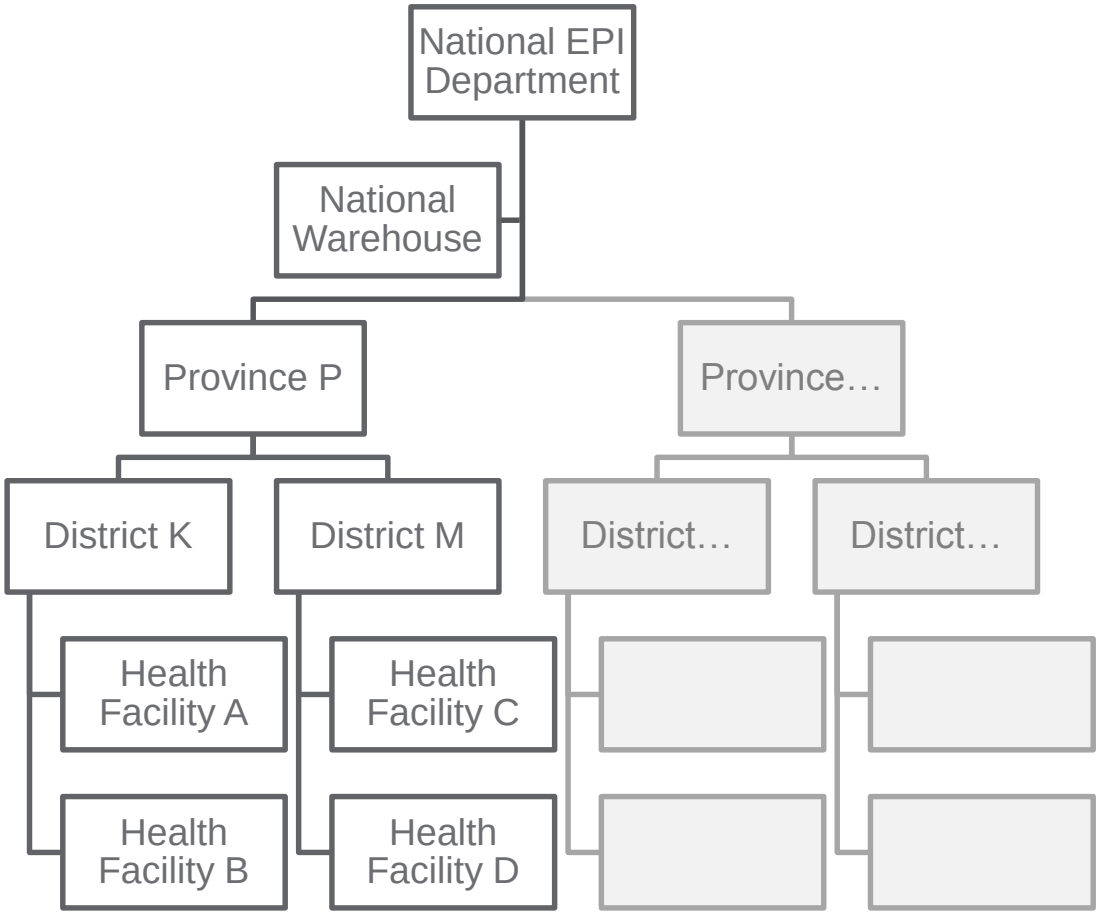
Management Information System

Combination of people and information needed to control a key business process or processes.

Logistics Management Information System

Use the flow of information to control the distribution of supplies.

Sample LMIS flow



Integration

describes
“the act or process or an instance of forming, coordinating, or blending into a functioning or unified whole.”

- International Telecommunications Union (ITU)
  Vocabulary Of Terms for International Mobile Telecommunications (2000)

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Interoperability

"permits data to be shared across clinicians, lab, hospital, pharmacy, and patient regardless of the application or application vendor"

- Healthcare Information and Management Systems Society (HIMSS) Dictionary of Healthcare Information Technology Terms

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Interoperability with a Health Facility Register

EPI Dept	Warehouse	DHIS2	MFL
PP-DK-HA	HF3601	2105	47632

PP-DK-HB	HF1024	763	24179
PP-DM-HC	HF2323	1402	36135
PP-DM-HD	HF3718	2181	48101

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Interoperability with a Health Facility Register

The National EPI Department would like to review a recent measles outbreak in the area of Health Facility C (PP-DM-HC).

They need data on the number of reported cases (in DHIS2), what stock has been supplied (Warehouse), combined with vaccine coverage for the facility

EPI Dept	Warehouse	DHIS2	MFL
PP-DK-HC →			
Coverage: 95%	Utilization: ??	Cases: ??	

LMIS INTEGRATION WITH AN IMMUNIZATION REGISTRY

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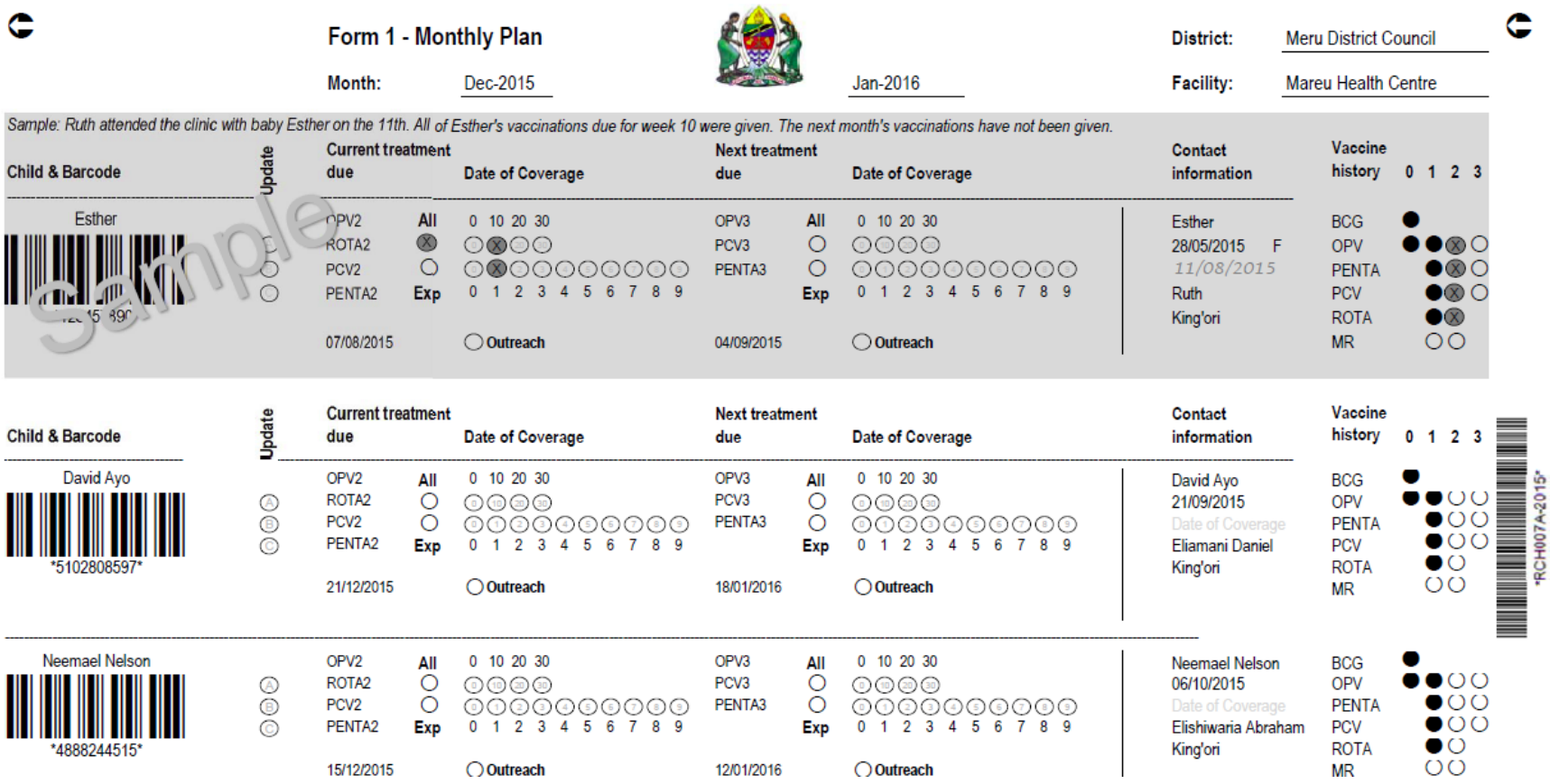
Form 1 – Monthly Plan



Form 1 - Monthly Plan

Month: Dec-2015 — Jan-2016

District: Meru District Council

Facility: Mareu Health Centre

Sample: Ruth attended the clinic with baby Esther on the 11th. All of Esther's vaccinations due for week 10 were given. The next month's vaccinations have not been given.

Child & Barcode	Update	Current treatment due		Date of Coverage	Next treatment due		Date of Coverage	Contact information	Vaccine history	0 1 2 3
Esther		OPV2	All	0 10 20 30	OPV3	All	0 10 20 30	Esther	BCG	●
		ROTA2	⊗	○ ⊗ ○ ○	PCV3	○	○ ○ ○ ○	28/05/2015 F	OPV	● ● ⊗ ○
		PCV2	○	○ ⊗ ○ ○ ○ ○ ○ ○ ○ ○	PENTA3	○	○ ○ ○ ○ ○ ○ ○ ○ ○ ○	11/08/2015	PENTA	● ⊗ ○
		PENTA2	Exp	0 1 2 3 4 5 6 7 8 9		Exp	0 1 2 3 4 5 6 7 8 9	Ruth King'ori	PCV	● ⊗ ○
									ROTA	● ⊗
		07/08/2015		○ Outreach	04/09/2015		○ Outreach		MR	○ ○
David Ayo		OPV2	All	0 10 20 30	OPV3	All	0 10 20 30	David Ayo	BCG	●
5102808597	A	ROTA2	○	⊗ ⊗ ⊗ ⊗	PCV3	○	⊗ ⊗ ⊗ ⊗	21/09/2015	OPV	● ● ○ ○
	B	PCV2	○	⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	PENTA3	○	⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	Date of Coverage	PENTA	● ○ ○
	C	PENTA2	Exp	0 1 2 3 4 5 6 7 8 9		Exp	0 1 2 3 4 5 6 7 8 9	Eliamani Daniel King'ori	PCV	● ○ ○
									ROTA	● ○
		21/12/2015		○ Outreach	18/01/2016		○ Outreach		MR	○ ○
Neemael Nelson		OPV2	All	0 10 20 30	OPV3	All	0 10 20 30	Neemael Nelson	BCG	●
4888244515	A	ROTA2	○	⊗ ⊗ ⊗ ⊗	PCV3	○	⊗ ⊗ ⊗ ⊗	06/10/2015	OPV	● ● ○ ○
	B	PCV2	○	⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	PENTA3	○	⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗ ⊗	Date of Coverage	PENTA	● ○ ○
	C	PENTA2	Exp	0 1 2 3 4 5 6 7 8 9		Exp	0 1 2 3 4 5 6 7 8 9	Elishiwaria Abraham King'ori	PCV	● ○ ○
									ROTA	● ○
		15/12/2015		○ Outreach	12/01/2016		○ Outreach		MR	○ ○

Sample

RCH007A-2015

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Form 2 - Registration

Fomu namba 2 – Taarifa za awali na zilizobadilika

Mwezi: 1 2 3 4 5 6 7 8 9 10 11 12

Wilaya: _____

Jina la kituo: _____

Barcode

Andika namba au Bandika Barcode hapa

Namba ya awali (kama inajulikana)

Jina la ukoo

Majina mengine

Jina mtoto

Jina la mama

Kijiji

Tarahe ya kuzaliwa

D: 0 10 20 30 / 1 2 3 4 5 6 7 8 9

M: 1 2 3 4 5 6 7 8 9 10 11 12

Y: 2014 2015 2016 2017 2018

Jinsia : ○ KE ○ ME

Namba ya simu ya mama

Tarehe ya dozi ya awali (BCG/OPV)

○ Taarifa mpya
○ Rekebisha
○ Potezea
○ Nje ya neo la huduma

Chanjo zilizopita	0	1	2	3
BCG	○			
OPV	○	○	○	○
PENTA		○	○	○
PCV		○	○	○
ROTA		○	○	
MR		○	○	

Chanjo aliyopewa

BCG ○
OPV ○
PENTA ○
PCV ○
ROTA ○
MR ○

Tarehe ya chanjo

0 10 20 30

1 2 3 4 5 6 7 8 9

○ **Outreach**

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Tanzania Monthly Health Facility Report on IVD Activities

Vaccine Stock (doses)										
Type of Antigen	Openning Balance (Doses)	Doses of Vaccine Received	Doses of Vaccine opened for vaccination	Doses discarded unopened	Reasons for Discarding unopened vial***	Doses of Vaccine Stock On Hand	No. of Days stocked Out	Children immunized	USAGE RATE (F/(C+D))*100	WASTAGE RATE (100-G)
	A	B	C	D		E		F	G	H
BCG										
OPV										
IPV										
DTP-HepB-Hib										
PCV13										
Rotavirus										
MR										
HPV										
TT										

***Reasons for discarding unopened vials: 1= expired vaccines 2= broken vial 3= cold chain failure 4= other (specify)

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Estimating vaccines and safe-injection equipment requirements

	Vaccines	Target population	Number of doses	Doses per vial	WMF	Doses needed	WMF syringes	0.05 ml AD syringes	0.5 ml AD syringes	2 ml reconstitution syringes	5 ml reconstitution syringes	Safety boxes
	A	B	C	D	E	F=B*C*E	G	H=B*C*G	I=B*C*G	J=F/D	K=F/D	L=(H+I+J+K)/100
Vaccines	OPV (oral)	100 000	4	20	1.33	532 000	1.11					
	TT	100 000	2	10	1.33	266 000	1.11		222 000			
	BCG	100 000	1	20	2.00	200 000	1.11	111 000		10 000		
	Measles	100 000	1	10	1.33	133 000	1.11		111 000		13 300	
	Hib	100 000	3	2	1.05	315 000	1.11		333 000	157 500		
	DTP-HepB	100 000	3	2	1.05	315 000	1.11					
Diluents	for BCG	100 000	1		2.00	200 000	1.11					
	for Measles	100 000	1		1.33	133 000	1.11					
	Total							**111 000**	**666 000**	**167 500**	**13 300**	**9578**

From Training for mid-level managers (MLM – WHO/IVB/08.01

Small Group Exercise

Recalling our definition for an LMIS…

> Use the flow of information to control the distribution of supplies

What data should be shared by the Immunization Registry?
What data is needed by the Immunization Registry?

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LMIS Ideal Stock Amount formula (DTP-HepB-Hib)

Formula variables

Population Source *	Surviving Infants
Target population percentage *	90 %
Doses per patient per year *	3
Wastage Factor *	1.1
Buffer stock level *	25 %
Adjustment quantity *	0 (+/-)
ISA minimum value	
ISA maximum value	

Monthly restock amount = {min, max} (population) * 0.90000 * 3 * 1.100 / 12 * 1.25000 + (0)

The calculated quantity for a population of 100 will be 31 doses of DTP-HepB-Hip per month

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How an LMIS integrates with an immunization registry

Immunization Registry

- Number of children registered
- Doses per patient /Vaccine schedule
- Number of children immunized
- Days of stockout

LMIS

- Target population
- Doses needed
- Doses discarded (closed vial waste)
- Wastage factor
- Buffer stock level
- Stock on hand

LESSONS LEARNED FROM INCORPORATING WHO EXCEL-BASED TOOLS

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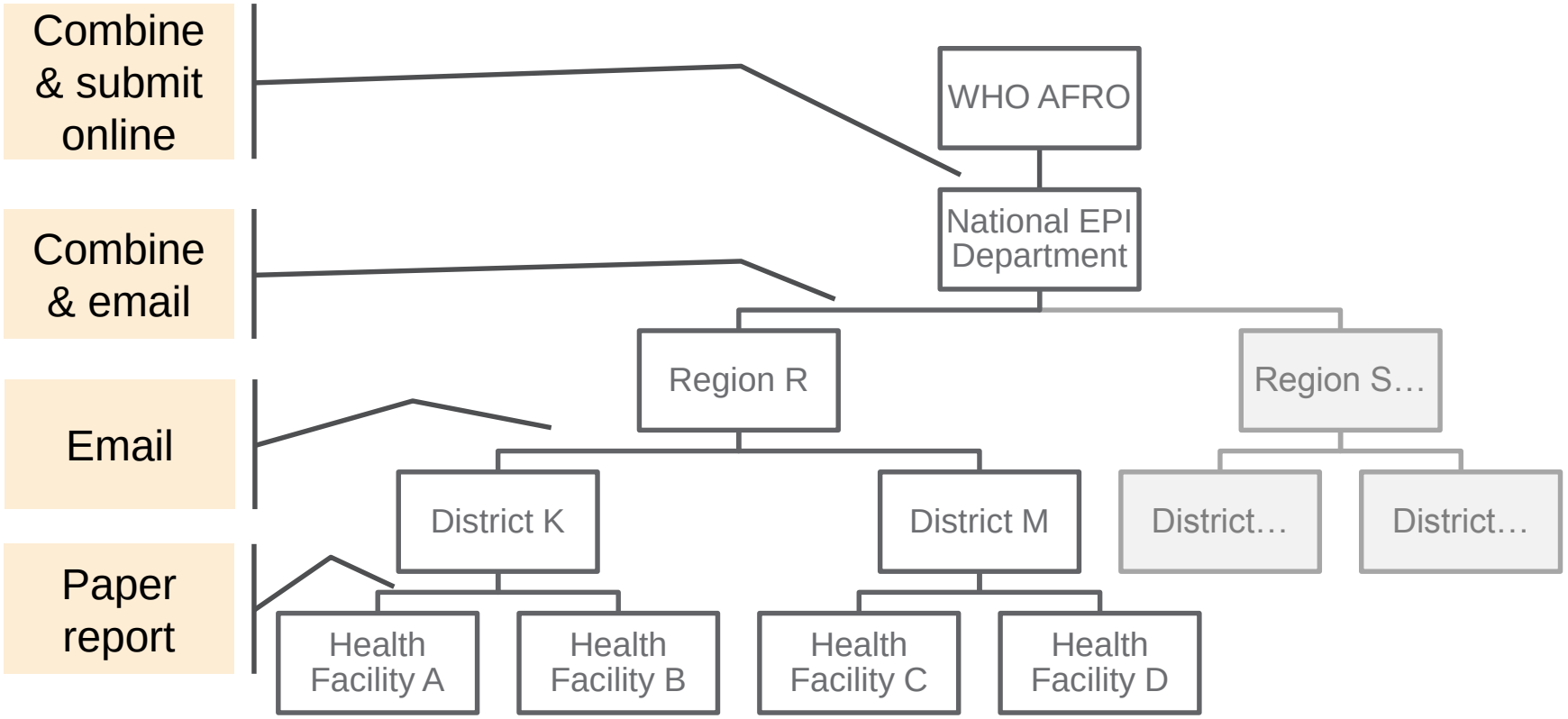
DVDMT data flow



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DVDMT programmatic data

VACCINES & VACCINATIONS

Routine Vaccines	Vaccination objectives & targets			vaccine presentation	Vaccine wastage (%)	Administration	Dilution syringes	Volume per target, cm3
	Schedule	Target (%)	Coverage (%)					
BCG	1	4.0%	90.0%	20	45%	ADS_0.05ml		2.18
OPV	4	3.8%	90.0%	20	10%	Oral		4.44
DTP-HepB+Hib	3	3.8%	90.0%	10	10%	ADS_0.5ml		21.50
PCV-13	3	3.8%	90.0%	1	5%	ADS_0.5ml		49.58
Rota	2	3.8%	90.0%	1	5%	Oral		#DIV/0!
Measles	2	3.8%	90.0%	10	35%	ADS_0.5ml		8.03
YF								-
TT	2	4.0%	90.0%	20	10%	ADS_0.5ml		5.56
HPV								-
HepB								-
VitA								-
LLINs								-

Demographic indicators	
% of pregnant women	4.0%
% of the annual births	4.0%
% of surviving infants	3.8%
% of adolescent girls	2.0%

Vaccines & Safe injection equipt	Critical stocks levels (weeks)		Lower & upper limits of adequate supply	
	Safety	Maximum	lower	upper
Vaccines	6	18	80%	120%
Safe injection equ	6	18	80%	120%

Categorisation based on access & utilisation of services		DTP-1 >=	DTP-1 <
		90%	90%
Dropout rate <=	10%	cat_1	cat_3
Dropout rate >	10%	cat_2	cat_4

Classification* based on coverage & wastage		Vaccination coverage	
		>= target	< target
low wastage	<= expected	clas_A	clas_C
high wastage	> expected	clas_B	clas_D

** this classification has been defined by Dr Clément Glèlè, Immunization Officer, MOH/EPI Béni*

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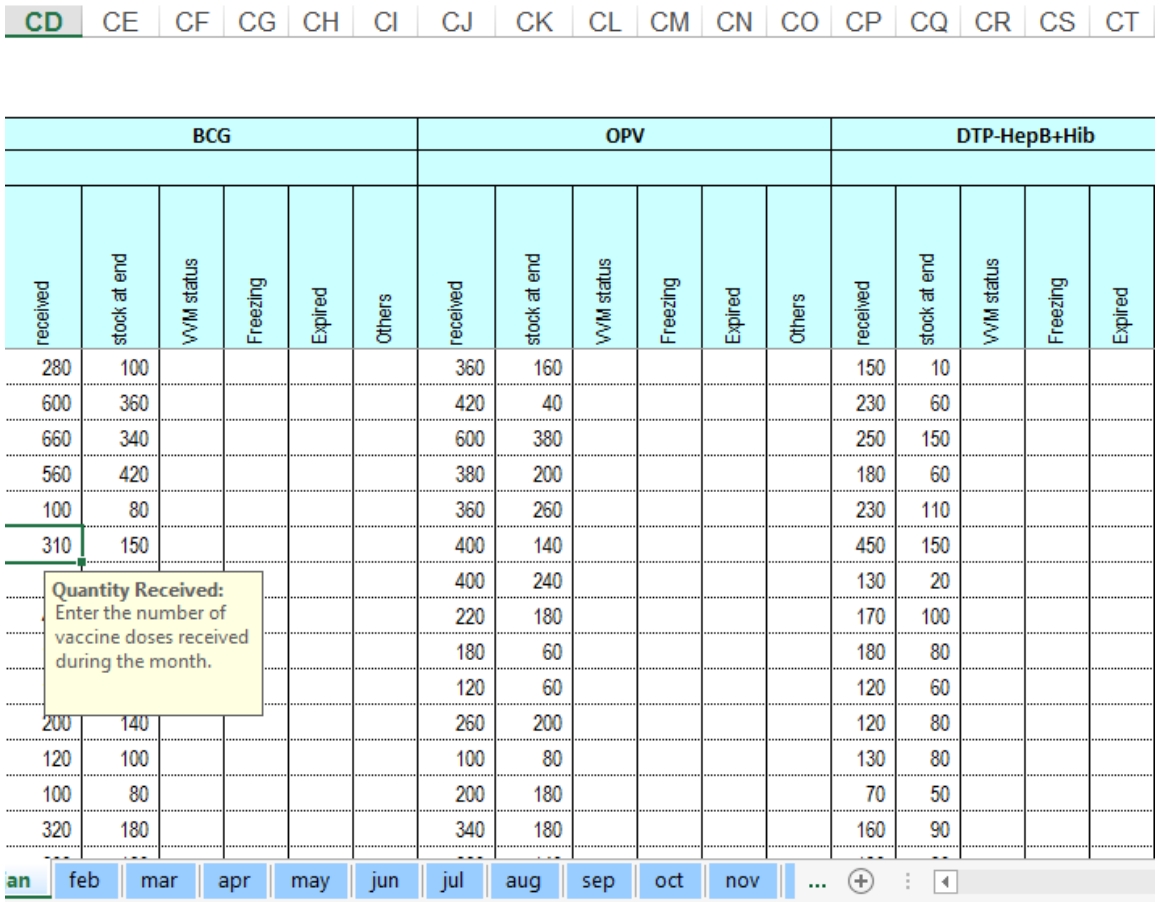
DVDMT facility demographics

	LIST OF FACILITIES							
	Provinces	Districts	Health centres	Total Population	Pregnent women	Annual births	Surviving infants	Vaccination points
4			4. Endabash H/C	14,450		449	449	
5			5. Endamarariek H/C	10,354		365	365	
6			6. Mang'ola H/C	14,891		431	431	
7			7. Rhotia H/C	14,639		420	420	
8			8. Ayalabe Dispensary	7,168		203	203	
9			9. Basodawish Disp	4,372		137	137	
10			10. Gyekrum Lambo Disp	5,797		180	180	
11			11. Endallah Disp	3,143		106	106	
12			12. Getamok Disp	4,315		134	134	
13			13. Khusumay Disp	3,312		112	112	
14			14. Buger Disp	6,600		235	235	
15			15. Qaru Disp	5,642		165	165	
16			16. Kansay H/c	6,931		305	305	

DVDMT monthly stock on hand reporting



CD	CE	CF	CG	CH	CI	CJ	CK	CL	CM	CN	CO	CP	CQ	CR	CS	CT
BCG						OPV						DTP-HepB+Hib				
received	stock at end	VVM status	Freezing	Expired	Others	received	stock at end	VVM status	Freezing	Expired	Others	received	stock at end	VVM status	Freezing	Expired
280	100					360	160					150	10			
600	360					420	40					230	60			
660	340					600	380					250	150			
560	420					380	200					180	60			
100	80					360	260					230	110			
310	150					400	140					450	150			
						400	240					130	20			
						220	180					170	100			
						180	60					180	80			
						120	60					120	60			
200	140					260	200					120	80			
120	100					100	80					130	80			
100	80					200	180					70	50			
320	180					340	180					160	90			

Quantity Received: Enter the number of vaccine doses received during the month.

an | feb | mar | apr | may | jun | jul | aug | sep | oct | nov | ...

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Lessons learned from incorporating District Vaccine Data Management Tool (DVDMT)

Benefits

- Provides “one page” report of facility indicators
- Produces charts and graphs used by mid level managers and mimics coverage monitoring charts at facilities
- Maps to data required for WHO AFRO monthly reporting

Challenges

- Large file, difficult to share
- Time consuming to identify data quality errors between months
- Not able to differentiate wastage differences between facilities
- Not connected with actual stock on hand
- Duplicative of DHIS2 reporting
- National EPI program looses visibility to facility trends

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Lessons learned from incorporating Stock Management Tool (SMT)

Benefits

- Provides visibility to stock availability across facilities
- Produces a “ledger” of stock management flow

Challenges

- Disconnected between different facilities; requires double entry at both locations
- Stock on hand in monthly report may differ with ledger; not easy to cross-reference the date
- Pack size of vaccines may vary by manufacturer
- Distribution of stock match values on DVDMT for same period

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Lessons learned from incorporating Cold Chain Inventory Tool (CCIT)

Benefits

- Enables calculations of cold chain utilization

Challenges

- Not tied to stock management flow; able to “over stock” a facility
- Not tied to alarm reporting from DVDMT
- Provides a snapshot in time of cold chain inventory; difficult to provide trend analysis of cold chain maintenance problems and duration

INTEROPERABILITY SCENARIOS OF DHIS2 AND AN LMIS

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Integrating DHIS2 and LMIS data

Benefits

Challenges

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Integrating DHIS2 and LMIS data

Benefits

- Improving the logistics system
- Improving service delivery
- Validating data
- Reducing data collection burden
- Support easier monitoring and evaluation of programs
- Enhance communication between service delivery and supply chain

Challenges

- Organizational structure
- Data source issues
- Data standards

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Recommendations for integrating DHIS2 and LMIS data

1. Encouraging communication across organizational boundaries
2. Create data-sharing agreements
3. Agree upon data standards
4. Test linkage of data
5. Resolve data quality issues

IN REVIEW

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What is the difference between…

Integration

Interoperability

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What other data sources should be integrated with your country's LMIS?

1.

2.

3.

Asante
Aikambe
Dankie
Merci
Medawagse
Nahavache
Ndilumba
Ndaga
Ngiyabonga
Obrigado
Thank You

BONUS… AUTOMATING INTEROPERABILITY WITH BARCODES

Overview

Jul-2014	Proof of Principle completed, demonstrating track and trace using GS1 barcodes on vaccine packaging from national arrivals to distribution at the districts
Mar/Jul-2015	Additional field tests of vaccine packaging by seven manufacturers shipping supplies to Tanzania
Jul-2015	Vaccine Arrival Report (VAR) at the national warehouse evaluated by the Medical Stores Department
Sep-2015	VAR added to Information Management System (VIMS) functionality as part of OpenLMIS/eLMIS
Jan-2016	User Acceptance Testing (UAT) for VIMS

Intermec CK71 Mobile PC (*new model supporting GS1 barcodes currently be procured by Tanzania Medical Stores Department*)

Socket Mobile CX2866-1338 7XiRx in tandem with laptop or tablet

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Objectives

Using barcodes to improve information flow at all levels of the supply chain

	Current		Future	
National	Limited visibility of vaccine arrivals		Date/time tracking of scans from initial Air Waybill down to distribution to facilities	
Region/ District	Time consuming and disconnected paper process to record vaccine movement		Significantly increase completion rates and data quality of lot and expiry tracking Alerts within VIMS to improve practices	
Facility	Practically impossible to track vaccine lot given to child		Automated data capture can be used to support AEFI investigation	

Way Forward

1. Additional barcode functionality integrated into OpenLMIS/eLMIS
   - Enabling barcodes as a “discoverable” service to support receipt, dispatch, inventory and stock adjustments.
   - Log date/time stamp, username/facility (if available), error code (if applicable) for additional analysis and manufacturer feedback
   - Improve serial number parsing for additional scanners and symbologies
   - Support export of data to Epicor and management of national stock locations
2. Ongoing support from vaccine manufacturers in 2015-2016
   - Modify and test current DataMatrix encoding on existing vaccine packaging to follow the GS1 standards
   - Add GS1 barcodes to the secondary packaging on vaccines that are part of the routine immunization program in Tanzania
   - Provide country with table of GTIN lookup data to cross-reference identifier with packaging sizes
3. Case study to document barcoding value proposition on secondary and tertiary packaging