



Innovative Mobile Technologies improving health in developing countries

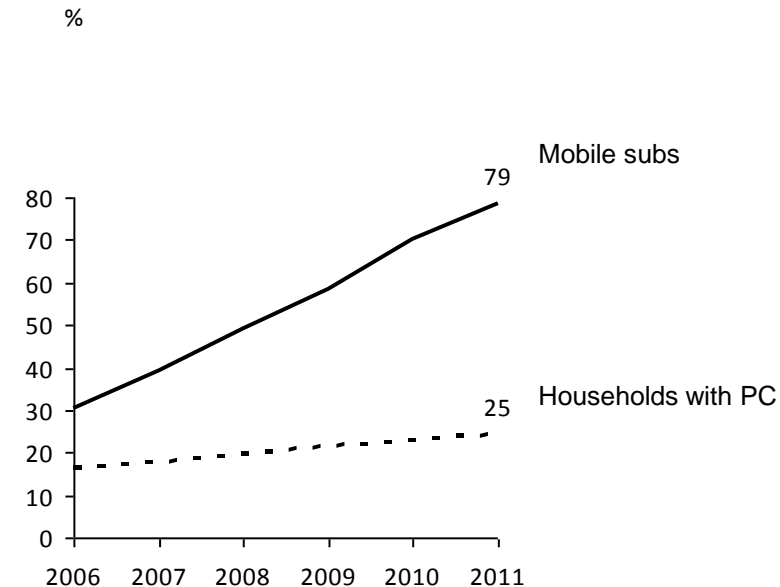
Professor Kristin Braa
Department of Informatics
University of Oslo

The importance of mobile technology for developing countries

- There are 4,5 billion mobile phones
- 305 millions PC's,
- but only 11 million hospital beds
- The mobile is the Internet device



The importance of the mobile phone to developing countries



- 79 mobile subscriptions per 100 inhabitants
- 25 PCs per 100 households

Diffusion of Mobiles and PCs in Developing Countries as of 2011

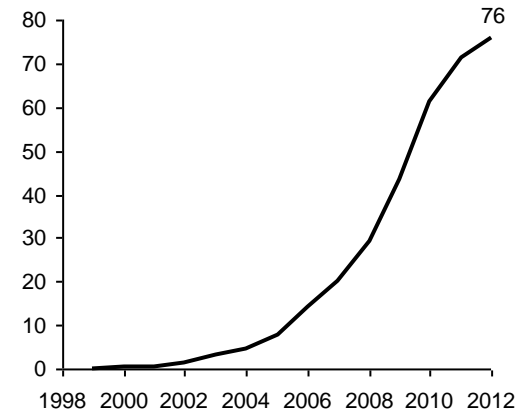
Data from the International Telecommunication Union (ITU)

Case: India

Mobiles exploding, few PCs

- 929 million mobile subs in May 2012 (78%)
- 142 million sub added in 2011
- 55 million PCs in use (2009)
- 4,7 PCs per 100 inhabitants
- 4,2 fixed Internet connections per 100 *households* (2011)
- 121 million Internet users (2011) 11%,
97 million are active (at least once in a month)
- Internet usage penetration growth is only 19%
- Broadband penetration 0,014%

Mobile subs per 100
inhabitants (2012)



Health Information Systems Program - DHIS2

- HISP is a global action research network headed and initiated at the Dept. of Informatics, University of Oslo since 1994
- DHIS 2 is an open source software developed, customized and used for reporting, analysis and dissemination of health data for **many health programs**
- Shared and integrated data warehouse for essential health data: **information for action**
- Implemented in 30 countries, national standard in 12 countries, WHO endorsed
- Joint 3-donor (PEPFAR, Global Fund, Norad) effort to strengthen DHIS 2 use in countries
- UiO Innovation award 2013



United Nations Millenium Development Goal indicators (2000)

- MDG 4
 - Underweight rate of children under 5
 - Under 5, Infant Mortality Rate,
 - Under 1 year measles immunisation coverage
- MDG5
 - Births attended by skilled midwives
 - Maternal Mortality Ratio
- MDG6
 - HIV (15-24 years) in ANC,
 - Malaria, TB prevalence, death and cure rates

DHIS 2 as an online national HIS

- integrated repository for all health statistics

dhis2

Kenya Health Information System

Maintenance

Services

Help

Profile

Ola Hodne Titlestad • Write feedback • 49 unread messages • 1 new interpretation

Profile Messages Interpretations

Search for users, charts, maps and reports

Insert Close Clear

Reports

DVI: DPT1-3, Measles and FIC
FP: Family Planning Attendance
FP: Family Planning Methods

Insert Close Clear

Maps

DRH: Live births 2012
DVI: Coverages yearly
HIV: HIV care visits (total) by County
OPD: Utilisation rate yearly

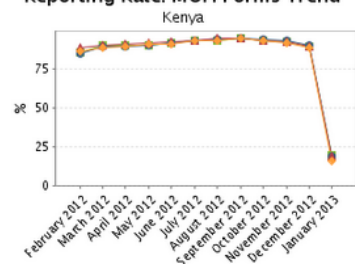
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Resources

DHIS 2 Home page
Frequently Asked Questions and Self learning materials for DHIS2
Millennium Development Goals

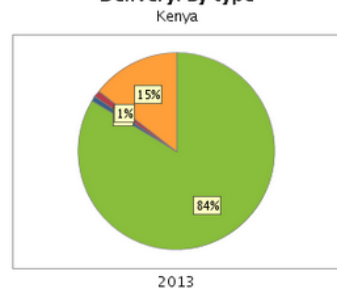
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Reporting Rate: MOH Forms Trend



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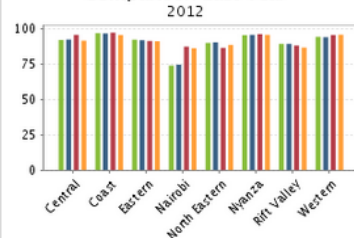
Delivery: By type



Normal Deliveries Breach Delivery
Assisted VD Caesarian Sections

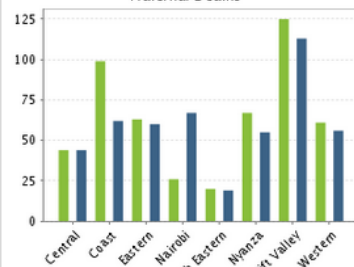
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Reporting Rate: MOH Forms Comparison Last Year



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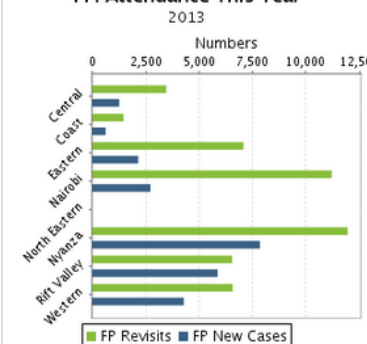
Maternal Deaths by province



Jan to Jun 2012 Jul to Dec 2012

Insert Close Clear View full size Share

FP: Attendance This Year



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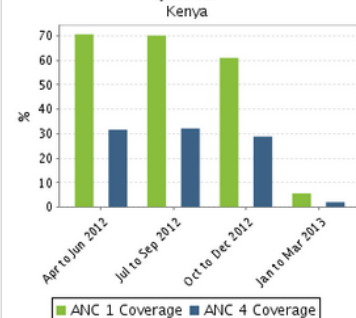
PMTCT Maternity C&T&HIV0+ quarterly



Women Counselled Mat Women Tested HIV
PMTCT-Maternity HIV+ve

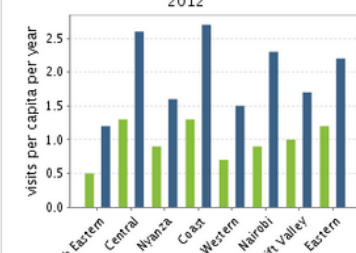
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ANC: Coverages (1st and 4th visit) by quarter



Insert Close Clear View full size Share

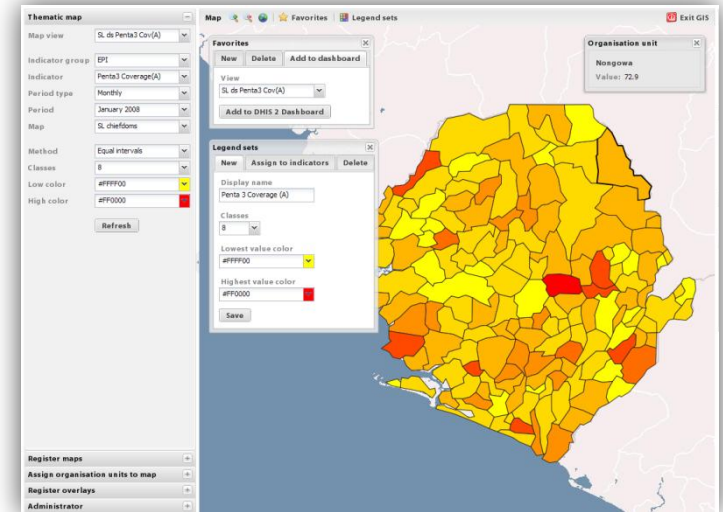
OPD utilisation (MoH-705) by province last year



OPD util. rate (705) OPD util. rate <5y (705)

Action oriented multidisciplinary research

- Strengthening national health information systems
 - Collaborating with Ministries of Health
- Building capacity locally
 - At present 32 PhD students worldwide. 20 graduated
 - PhD school
 - 5 international Masters program
 - DHIS Academy (East Africa, West Africa, Asia, Latin America)
- Research theme: Implementation
 - Interoperability
 - Architect(ing)
 - Scaling
- Open source software development done in a global network

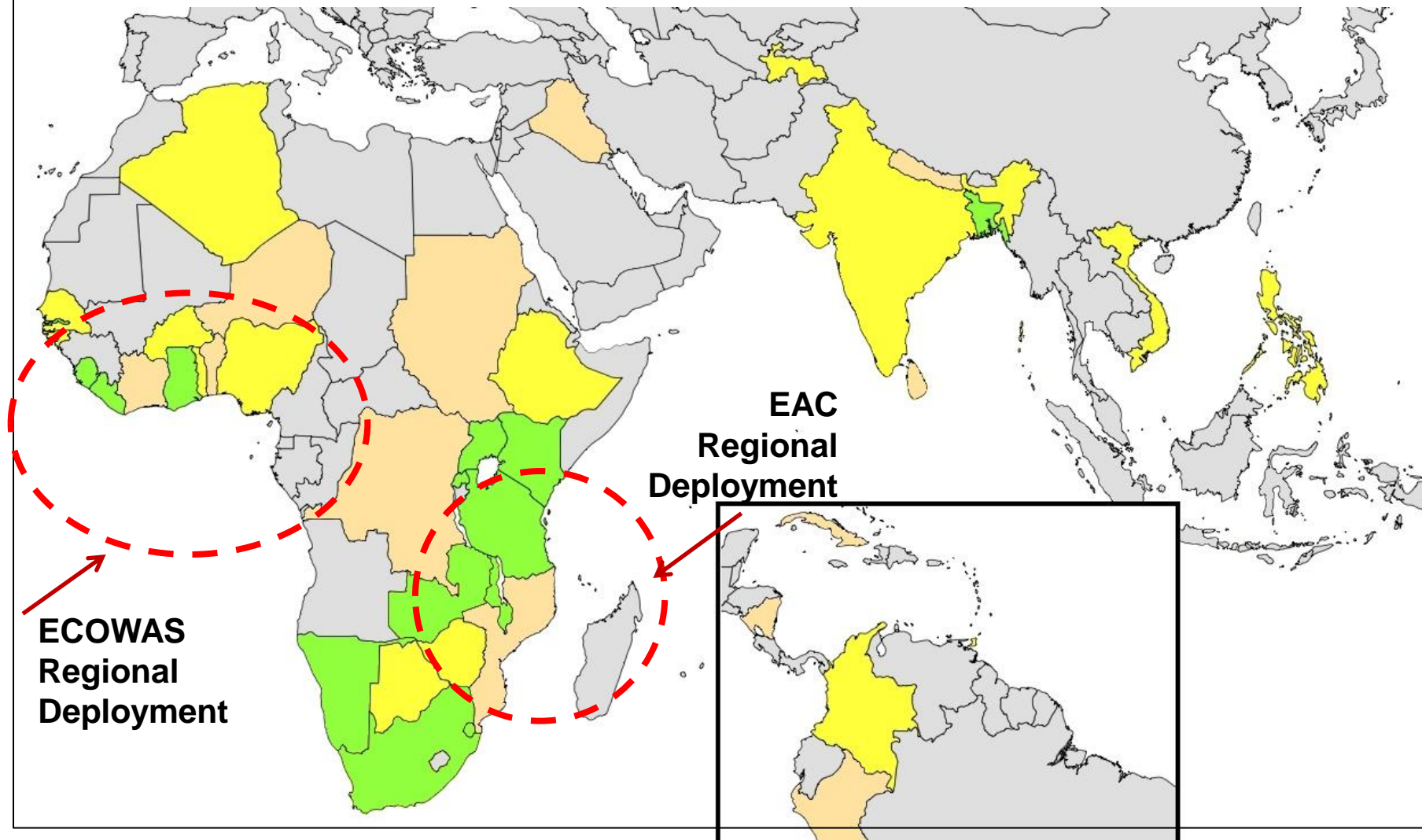


DHIS 2 Academy:

Regional training program in East Africa, West Africa, Asia, Latin-America



Advanced DHIS 2 Academy, Entebbe, 4-13 June 2013



Present in over 30 countries, 10 Indian states

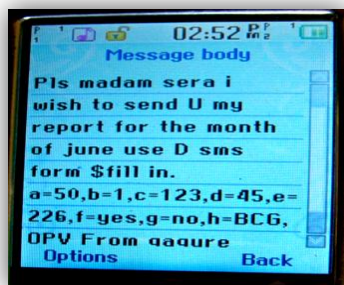
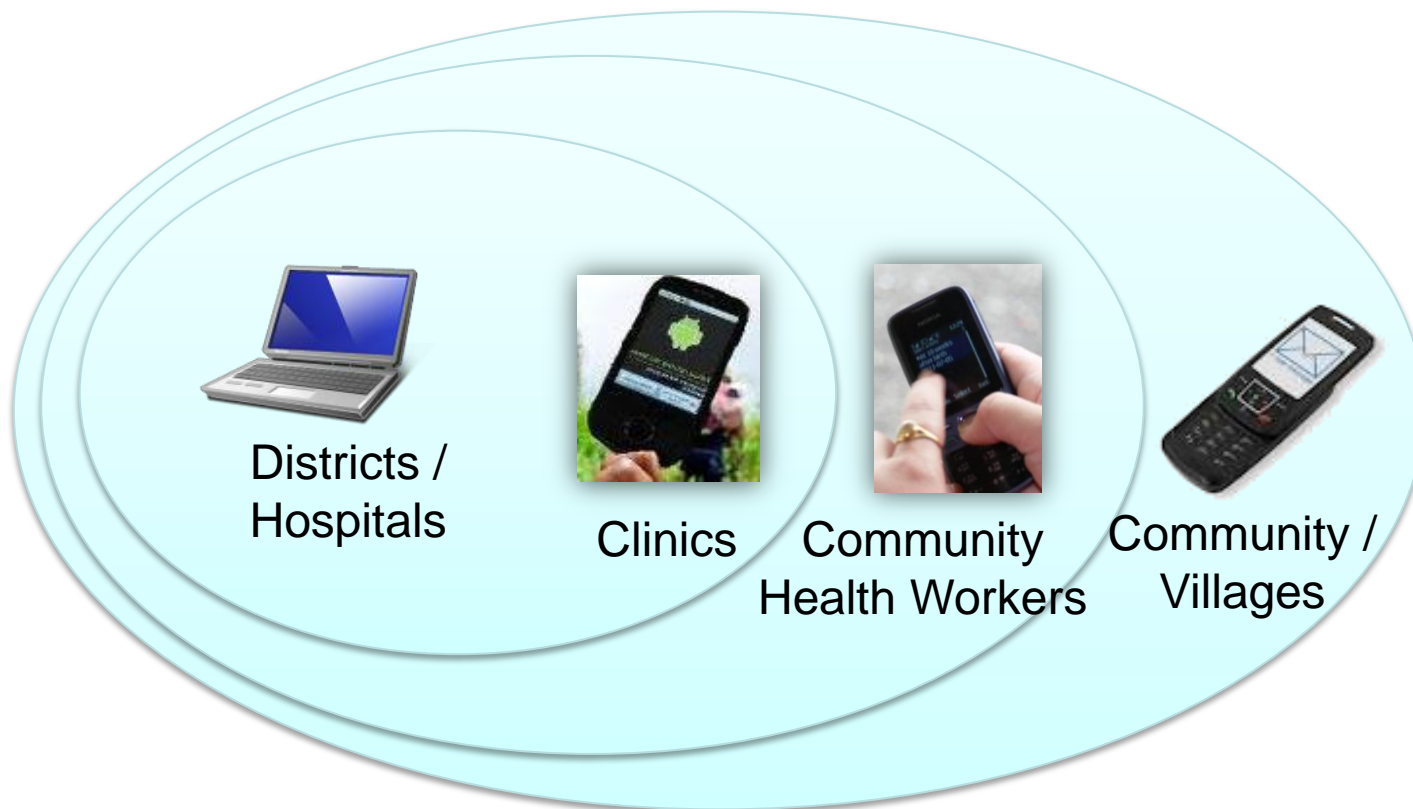
National standard in Kenya, Ghana, Uganda, Rwanda, Liberia, Nigeria, Sierra Leone, Gambia, Zanzibar, Malawi, Zimbabwe

Green = National HIS deployment

Yellow = National start-up / pilot

Orange = early national initiative or program-specific deployment

Extending the DHIS reach through mobiles



SMS



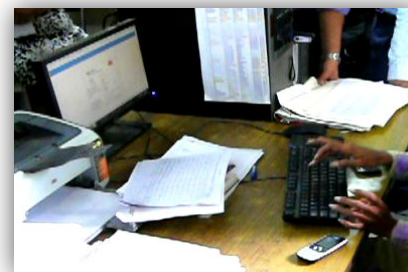
Java



Browser



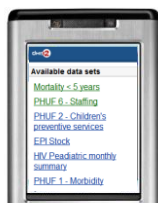
Android



PC/laptop/tablet

A suit of mobile applications for different available infrastructure

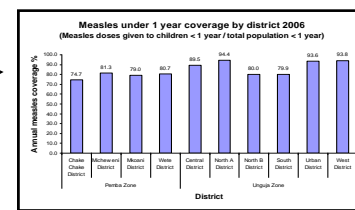
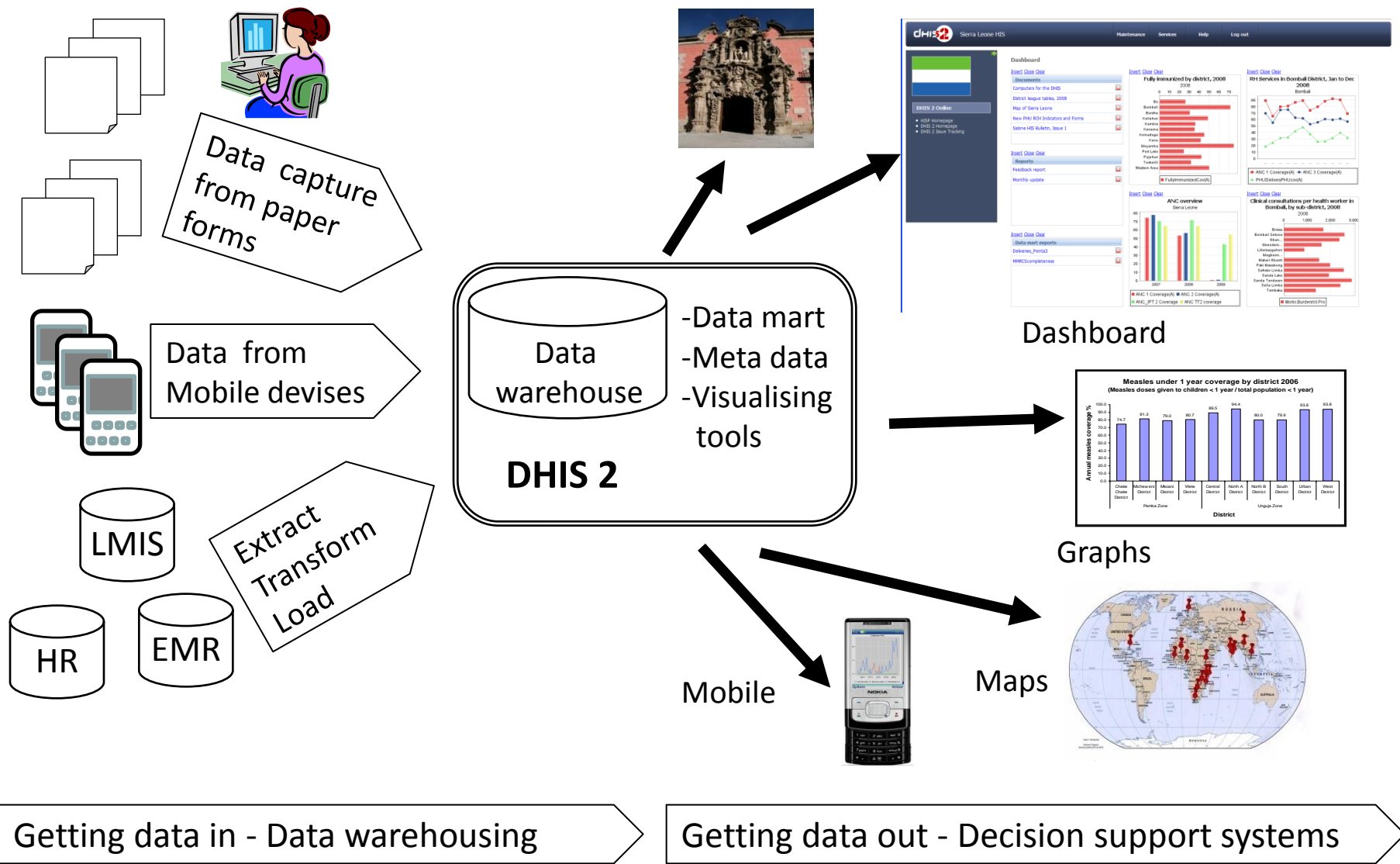
- Voice calls
- SMS (sent directly from the user)
- Java client with SMS or data
- Mobile browser (native/OperaMini)
- Smartphone browser or app
- Tablets browser or app
- PCs with web browser & mobile data



Low resource constraints

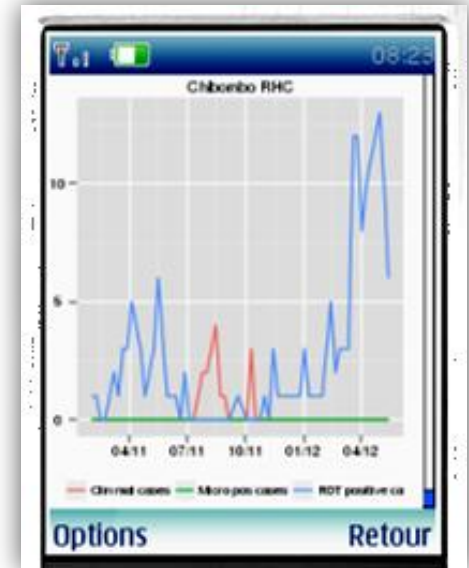
- Sometimes no power, no roads
- Expensive to buy good phones
- Low end phones: cheap, simple, small screens and limited **usability**
- Leverage **installed base of users' phones?**
 - Increases complexity: multiple operators, more handsets, more training, private subscriptions



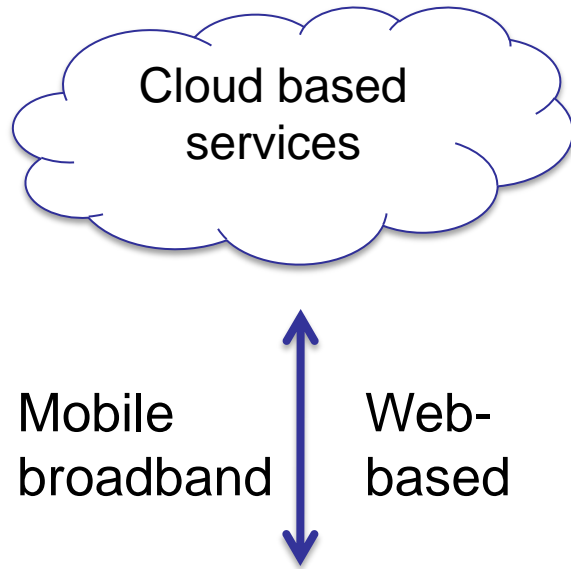


Learning through network of action

- **Kenya**
 - National online HIS using mobile internet
 - Facility census SARA
 - PEPFAR reporting
- **Ghana**
 - Fast moving learning from Kenya
 - Limited resources
- **Uganda**
 - Maternal and neonatal death audits
 - Tracking of pregnant women
 - SMS reporting on eMTCT
 - ARV ordering
- **Punjab**
 - Mobile HIS reporting, 6000 health workers
- **Zambia**
 - 600 mobiles for malaria incidence reporting



Developing countries \neq low-tech: Kenya



Country wide implementation

- Cloud-based – secure, fast deployment and easy to maintain
- Web-based \rightarrow flexible updating of the service
- HTML5 with offline-support
- PC with mobile broadband
- Support for mobile phones
- Integrated messaging system connecting the users
- Sharing of advanced reports and analysis with GIS support

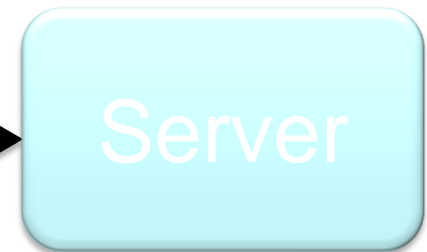


Offline support

- **Network coverage variability/instability requires offline capabilities**
- When there is no coverage – store locally and submit later

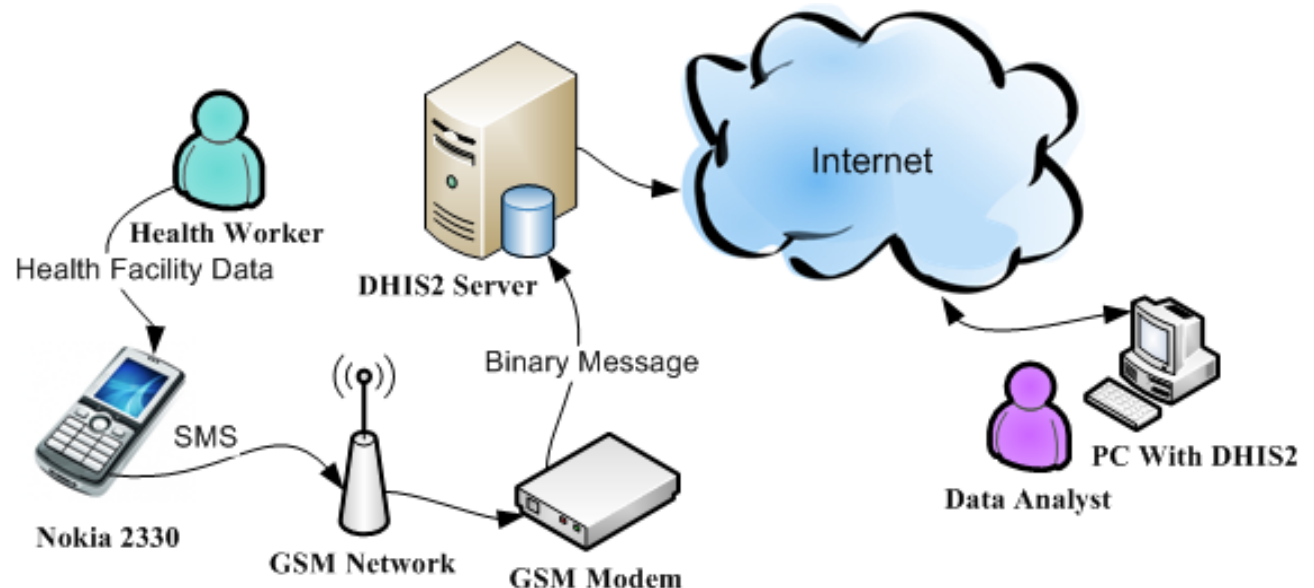


unstable network



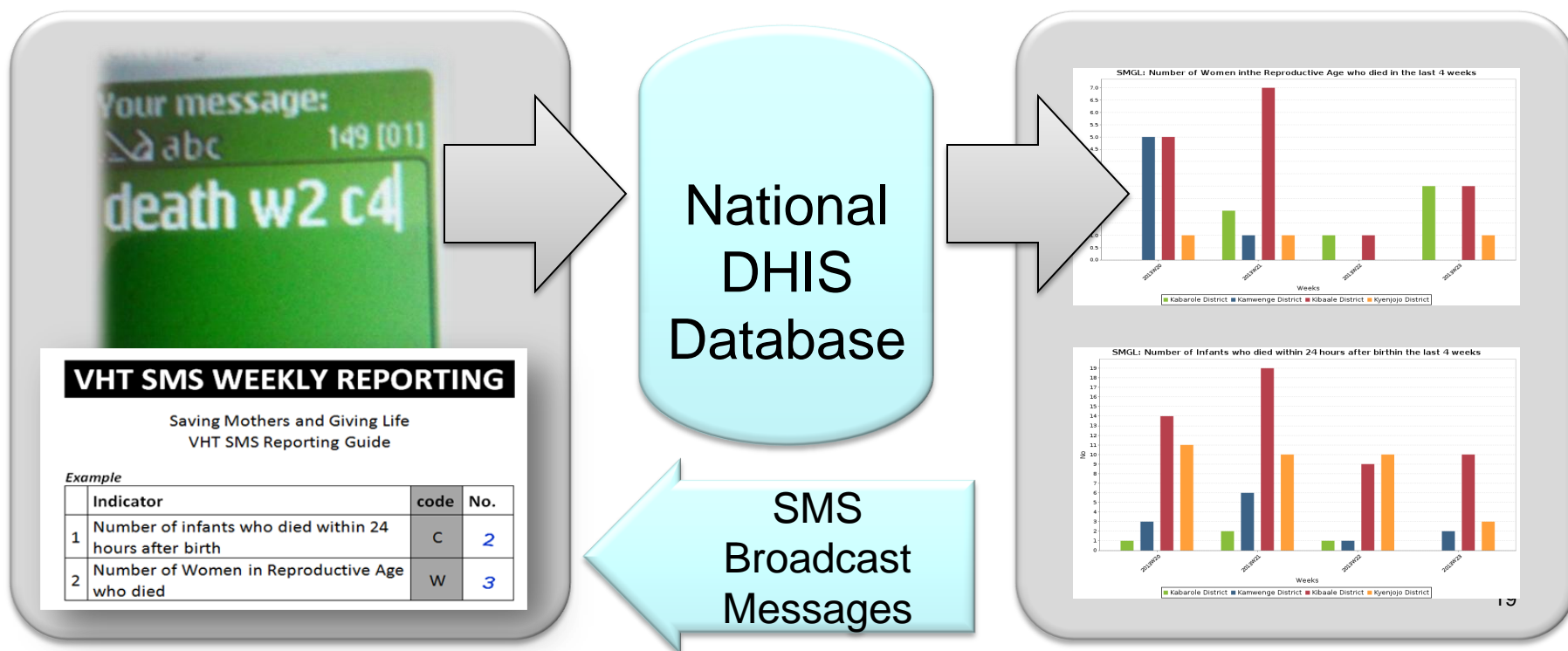
Java-based mobile reporting in India

- **Punjab** – 6000 Auxiliary Nurse Midwives (ANMs) reporting weekly and monthly using the DHIS-Mobile Java client
SMS used as transport. Forms can be stored locally. State has purchased phones and pays for subscriptions.
DHIS2 is the state-wide national Health Information System.
Paper based reporting still happens and feeds into DHIS2.



Uganda "Saving Mothers Giving Life"

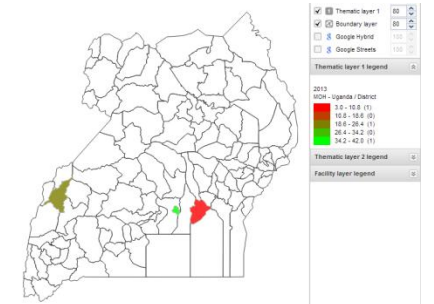
- Project in 4 districts in Uganda
- National DHIS2-based infrastructure is used for reporting most routine data from clinics
- SMS reporting by Village Health Teams (CHWs)



SMS Broadcast to Village Health Teams and Beneficiaries

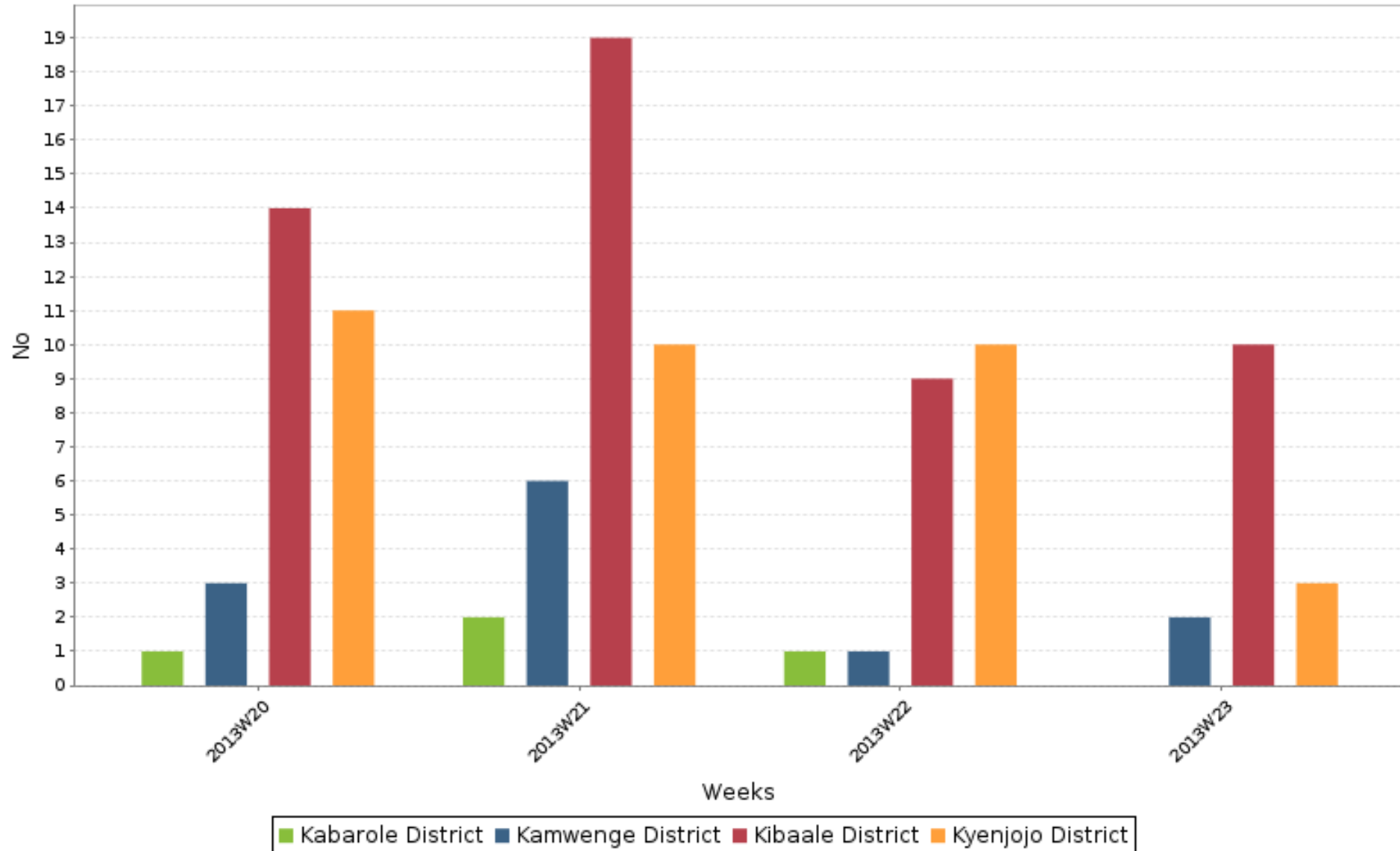
The screenshot displays the 'dhis2' MCH Web EMR interface. The top navigation bar includes 'dhis2', 'MCH Web EMR', 'Maintenance', 'Services', and 'Help'. A left sidebar contains a 'DHIS Mobile Configuration' menu with options: 'Person Mobile Settings', 'Dataset for Mobile', 'SMS Service Configuration', 'Send SMS', 'Receive SMS', 'SMS Commands', and 'J2ME Client Update'. The main content area is titled 'Send SMS'. It features a 'Send SMS to:' dropdown menu currently set to 'User assigned to organisation unit', a 'Phone number:' input field, and a 'Message' text area containing the text: 'Please be informed on the ongoing distribution of misquote nets to pregnant women and children in your villages'. Below the message area is an 'Organisation Unit Selection' section with buttons for 'Select at level', 'Un-select at level', 'Select in group', 'Un-select in group', and 'Un-select all'. The 'Select at level' dropdown is set to 'Village'. The 'Select in group' dropdown is set to 'Administrative Uni'. A list of organisation units is shown below, including 'Kataraka HC IV', 'Kitumba Parish', 'Binanata A Village', 'Bugunda Village', and 'Kabegira Village'.

From SMGL: Dear VHT member, Encourage all pregnant mothers to attend antenatal care at least four time during pregnancy



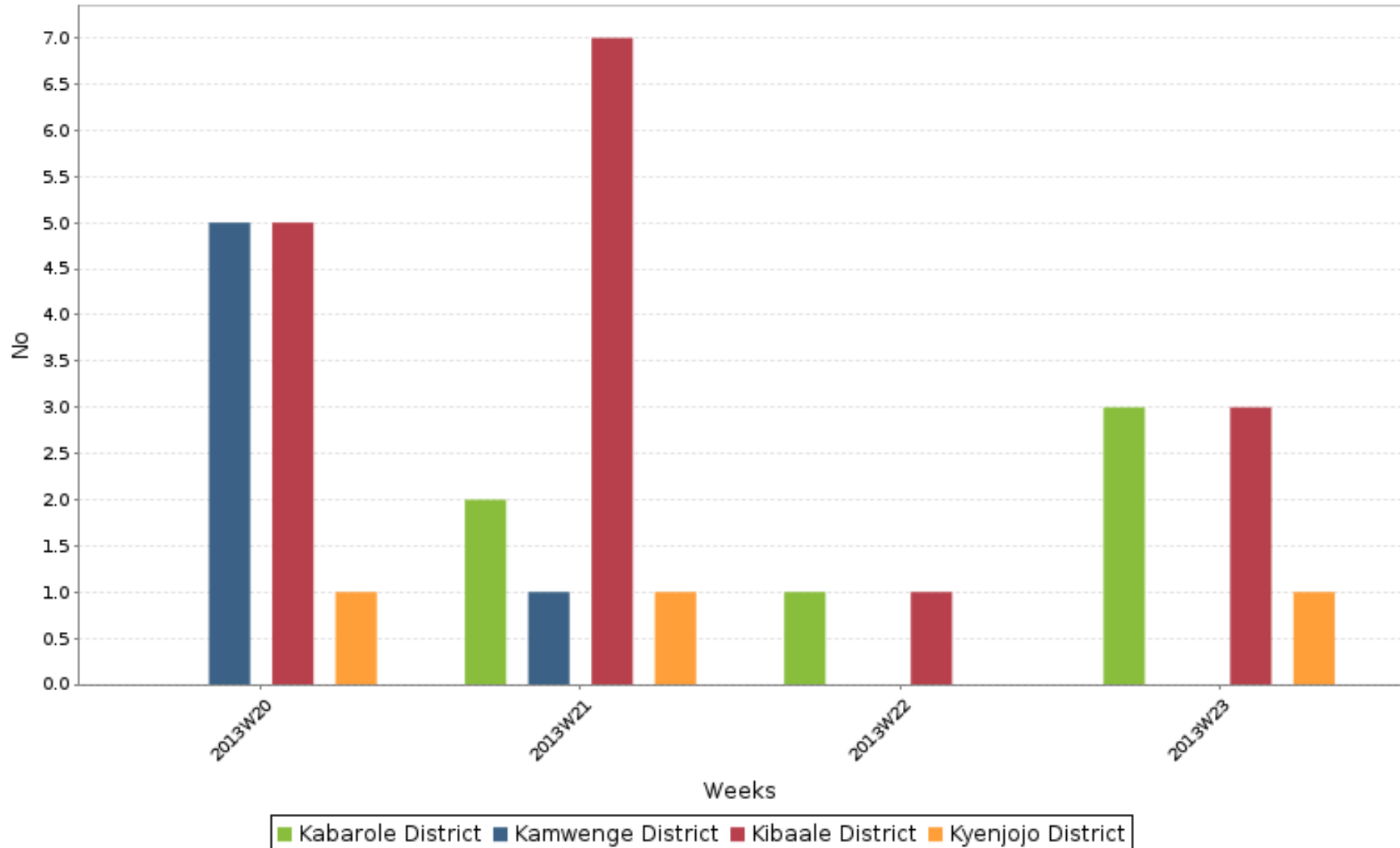
Results

SMGL: Number of Infants who died within 24 hours after birth in the last 4 weeks



Results

SMGL: Number of Women in the Reproductive Age who died in the last 4 weeks



Uganda: eMTCT - SMS Weekly Reporting

- Goal: Elimination of mother to child transmission of HIV
- Rolling out to 2,400 Option B+ implementing service outlets

OPTION B+ SMS WEEKLY REPORTING

	Indicator	code	
1	Total No ANC 1 st visit	a	400
2	Total No ANC tested	b	359
3	Total No tested HIV +	c	50
4	Total ANC 1 st visit known HIV +	d	98
5	Total initiating Option B+	e	10
6	Total ANC 1 st visit on ART before	f	50
7	Total missed appointment	g	0
8	HIV kits available?	h	N
9	ARVs available?	i	Y

SMS Code *for the example above the sms would look like*
pmtct a.400.b.359.c.50.d.98.e.10.f.50.g.0.h.n.i.y

pmtct
a.400.
b.359.
c.50.
d.98.
e.10.
f.50.
g.0.
h.n.
i.y

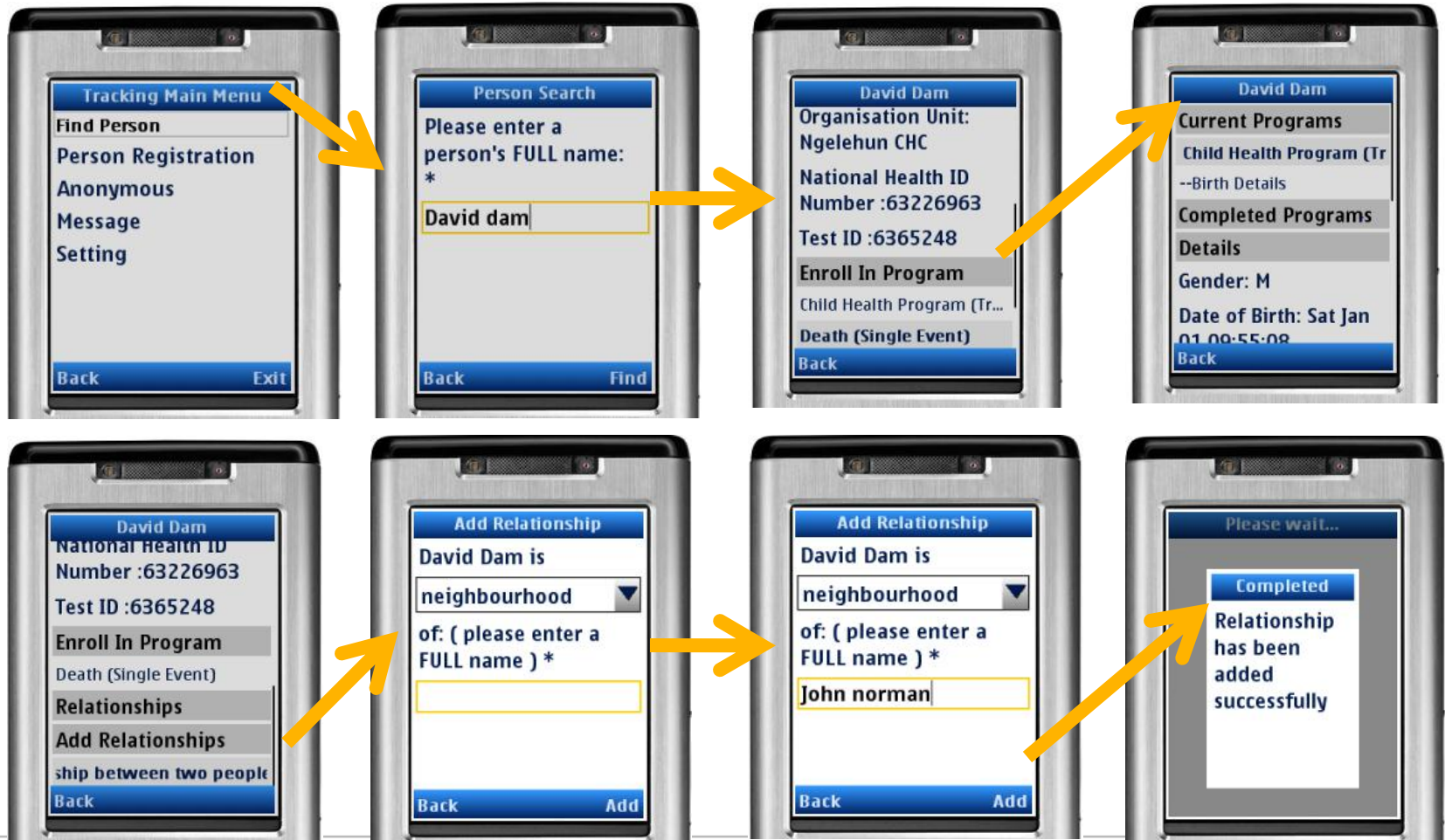
Uganda – Mother/Child tracking

- Integrated service for tracking mothers and children through pregnancy-delivery-postnatal
- 10 facilities.
- PC, Tablets, Smart- and feature phones, SMS
- Key challenges:
 - Mothers access many clinics. Data is lost. Unclear responsibility for follow-up
 - Fitting a common system into multiple clinic contexts, sizes and workflows
 - Integrating community health workers into electronic system for follow-up, using SMS
 - How to best remind mothers of appointments (SMS)
 - Maintaining privacy of data while sharing
- DHIS Tracker is used to implement the project

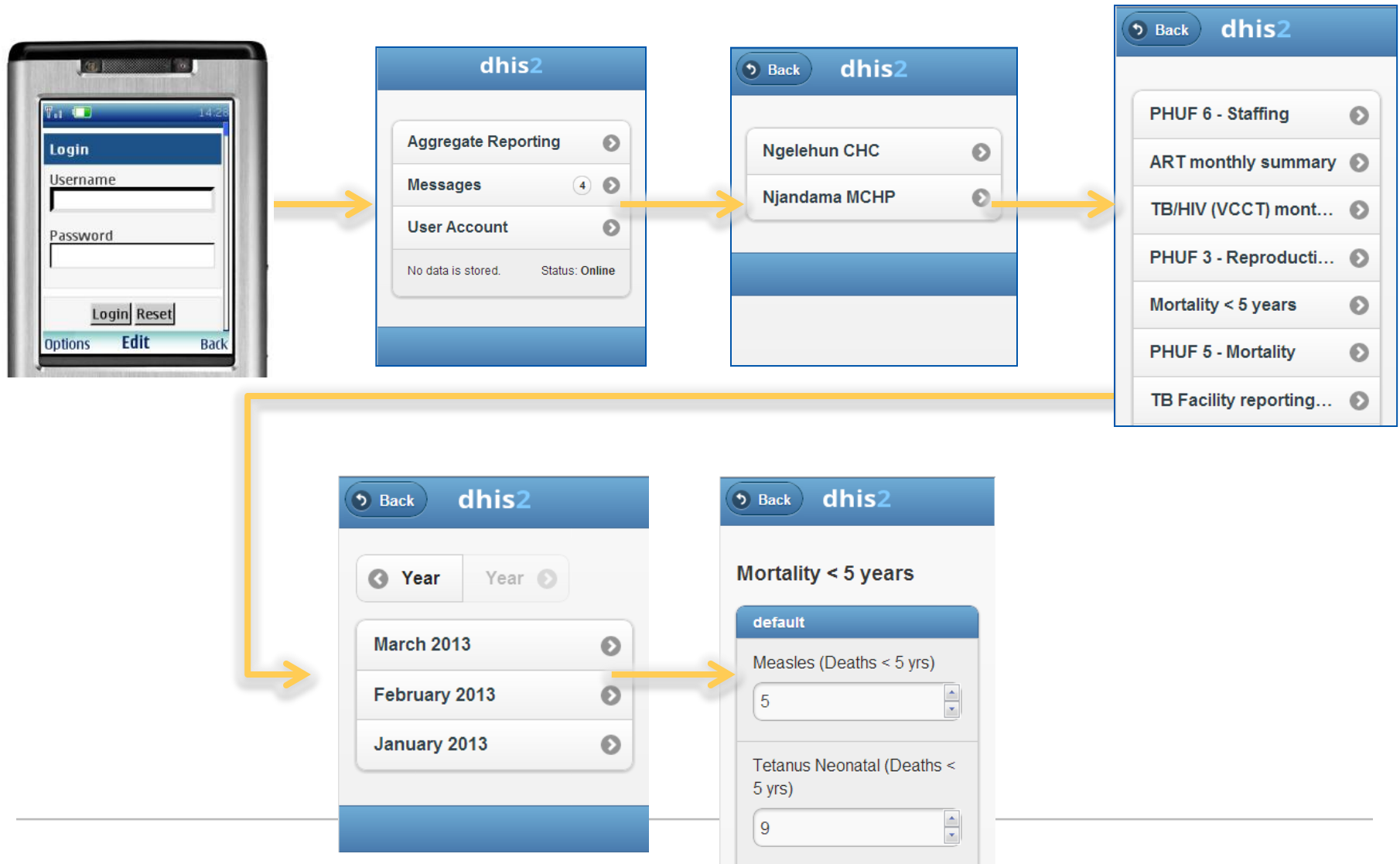
18.10.2013



Find Person, Enroll and Add Relationship



DHIS on smartphones with offline support

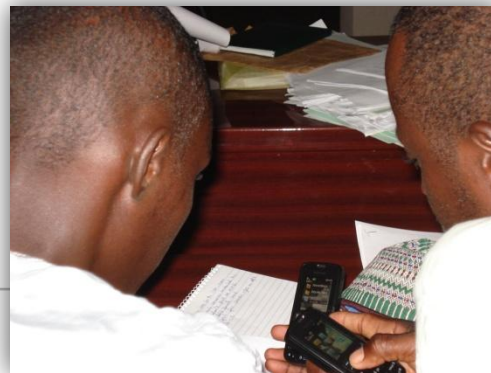


Leverage on the social network



Mobile = communicate and share

- The mobile is primarily a communication tool!
- Don't forget to improve communication, even if it is the secondary goal of a specific mHealth project
- Community features help create sustainability
- Example: Closed User Group makes people positive about project and acts as an attractor



Improving data quality through social media

Interpretations

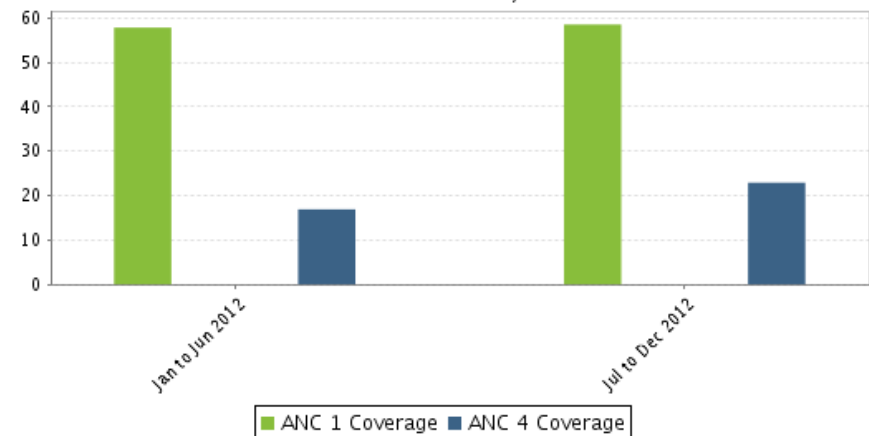
- Charts, reports, maps can be shared with other users of DHIS 2
- Discussion forum open to all users to comment on the data
- Fostering communities of data use



Nicholas Kirimi 2012-11-20

bjsj

ANC Visits-Turkana County
Turkana County



Nicholas Kirimi 2012-11-20

What could be the solutions to ensure that Mothers atleast attend 4 ANC visits?

ADEN HAMBE 2012-11-25

24 HOURLY ANC services in health facilities

Wilfred Kazungu 2012-11-26

Ensure that health education on early initiation of ANC services is done and that mothers are encouraged to attend at least 4 times clearly explaining the benefits accrued by doing so. Most service providers have relaxed in the area of health education including you and me. Lets wake up and some change will be seen.



Dashboard

Dashboard
Profile
Messages
Interpretations
User groups

DHIS 2 Online

Home Page
Launchpad Site

Messages

Write message

Write feedback

Inbox

Follow up

Unread

Sender	Subject	Date		
David Ndungu (3)	data verification	2013-09-17		
pamela nasambu (3)	Data set report for MOH 710 immunization version 2	2013-09-17		
Samuel Cheburet (7)	Inpatient morbidity and mortality template	2013-09-16		
Benedict M.Nzivo (12)	New DHIS version: Reporting rates in Data Visualizer	2013-09-16		
ELIZABETH GITONGA	challenges in version 2 of immunization summary	2013-09-16		
Esther Kathini (3)	MFL SYSTEM LOGIN WEBSITE ADDRESS CHANGES	2013-09-13		
Wilfred Kazungu (2)	I want to enter data	2013-09-12		
Elijah Magongo (5)	Data Entry Module	2013-09-09		
Khalwale amwoga khalwale amwoga	health	2013-09-06		
Tirus wanyoike	DHIS 2 Activities /Projects	2013-08-27		
Ayub Manya (2)	DATA ENTERY	2013-08-23		
Esther Kathini	MFL SYSTEM LOGIN WEBSITE ADDRESS CHANGES	2013-08-23		
Nancy Amayo (2)	DHIS TRAINING	2013-08-22		
Nancy Amayo (2)	morbidity and mortality reporting	2013-08-22		
MaryStella Barasa	Great grand parent organisation unit	2013-08-22		
Ayub Manya (2)	population estimates	2013-08-19		
Ayub Manya (2)	ASAYI 731 SECTION FOUR	2013-08-14		
Patrick kamau	moh 710 version implementation	2013-08-14		
Charles Chege (3)	July 2013 Reports	2013-08-14		
Charles Chege (3)	MOH 710 - IMMUNIZATION version 2	2013-08-14		
mohamed abdalla (3)	MOH 711 FOR MUNICIPAL FACILITIES FOR THE ,MONTH OF JUNE 2013	2013-08-13		
mohamed abdalla	MOH 711 report for the month of june 2013	2013-08-13		
Samuel Cheburet (3)	New MOH 710 Reporting tool	2013-08-12		
Samuel Cheburet (2)	neonatal deaths	2013-08-12		
Ayub Manya (2)	PWP data	2013-08-08		
mohamed abdalla (3)	CHAANI MCM FACILITY:MOH711REPORTFOR THE MONTH OF JUNE 2013	2013-08-07		



Dashboard

Dashboard
Profile
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User groups

DHIS 2 Online

Home Page
Launchpad Site

Mark as unread

Remove

Back

Scroll down



Inpatient morbidity and mortality template

**Wattson Ontweka** 2013-09-09

Hi team,

The above mentioned reporting tool has been removed from DHIS and we have information on where to report data to . Please give us a clear explanation on the same.

**Samuel Cheburet** 2013-09-09

Thanks for your concern, Please use individual records to enter inpatient data.

**Wattson Ontweka** 2013-09-12

Thanks Samuel for your response. But really i don't understand how i can use individual records simply because it is all about diagnosis and their codes, and according to chapters.

**Samuel Cheburet** 2013-09-16

Thanks Ontweka. 1. Click individual records. 2. Click on single event without registration. 3 click you facility name at the left hand side. 4 Select the programme which is morbidity and mortality. 5. click add new. 6 Click Date of Discharge and a calender will appear. and finally a data entry appear for coding.

To generate report use tabular report.

**Wattson Ontweka** 2013-09-16

Thank you very much Samuel for your assistance. I have gotten you right but the problem now is that when it comes to the diagnosis, it is only neoplasm codes for chapter two that are appearing. Please assist and thanks once more for your commitment to guide me.

**Wattson Ontweka** 2013-09-16

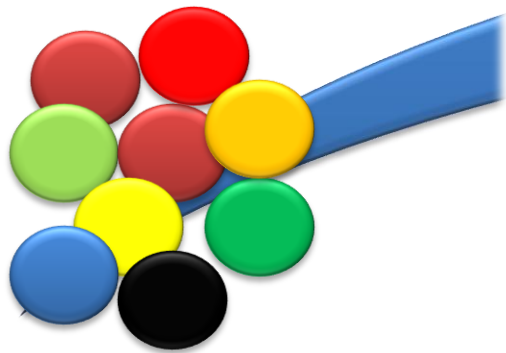
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**Samuel Cheburet** 2013-09-16

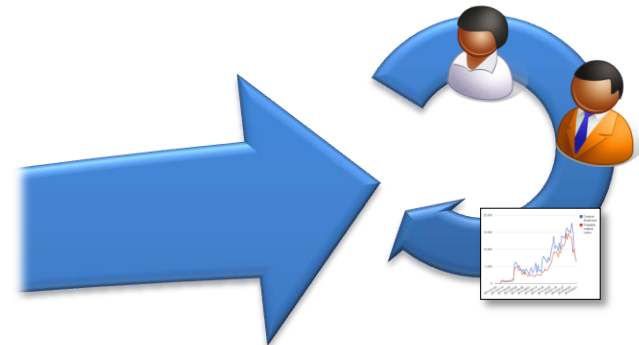
Thanks, it is not not only neoplasm. All codes are there. you can type Alphanumeric or disease name eg you type B54 or malaria.

Research agenda: Pilot to scale

Pilots



Early decisions of
solution type
create path
dependencies



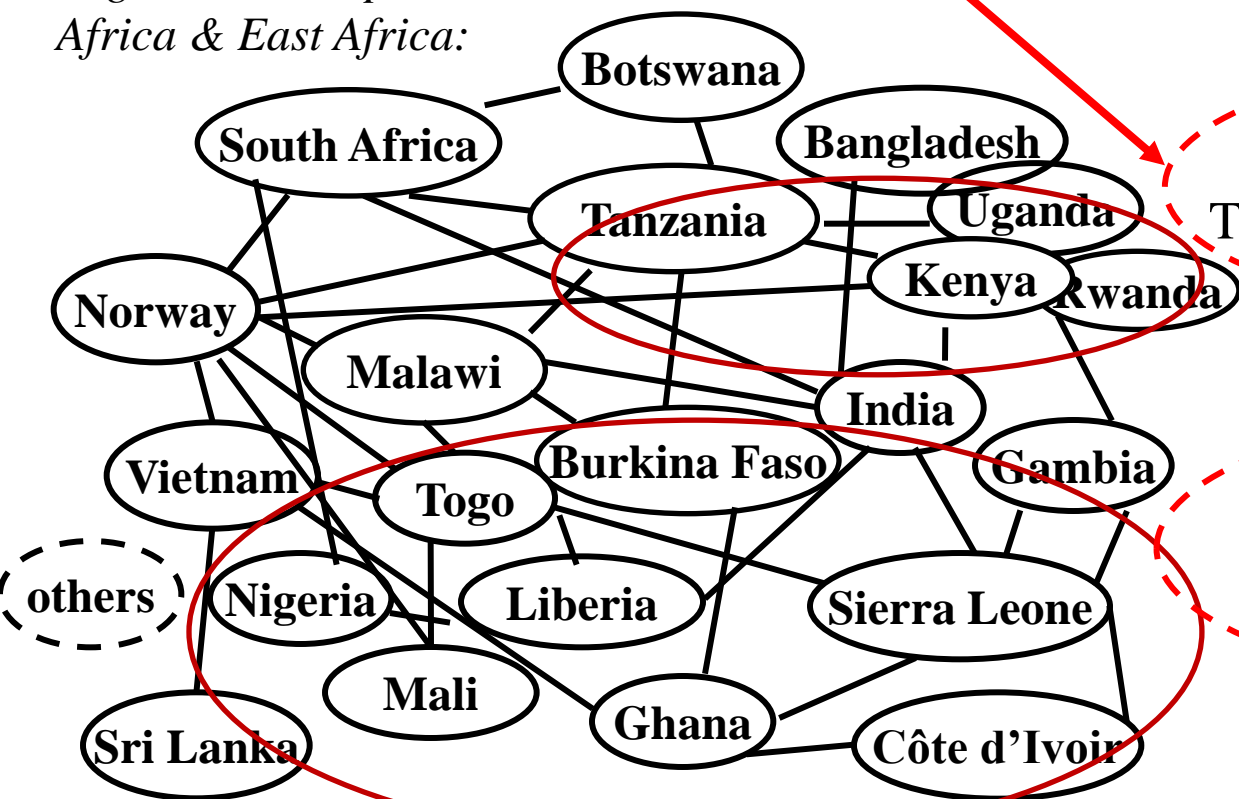
Principles for pilot to scale

- Leverage existing systems – think national
- Work with the Ministries of Health
- Put servers online, but think offline...
- Think scale already in the pilot phase
- Support a range of mobile devices
- Do not get locked in to one mobile operator
- Use local resources to drive implementation
- Work with partners – a network of action
- Share the collected information!!

Health Information Systems
Research, Implementation Development

Open Source Software DHIS2
Sharing across the world

*Regional development West
Africa & East Africa:*



Capacity Building
Training, Education, Research

Partner contribution
PSI, Pepfar, Global Fund
Use of DHIS for own reporting
& development

High tech – low resource – big impact



Thank you