



Computing and Global Health Lecture 3 Last mile data collection and Tracking


Winter 2015
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Today's topics

- Readings and assignments
 - Cold chain assignment review
- HISP Case study – Ghana
- Last mile data reporting
- Tracking vs. Surveillance
- Electronic Registers
 - Challenges



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Readings and Assignments

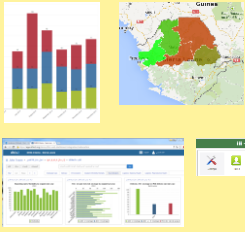
- Homework 2
 - Requirements for aggregating facility reports
- Readings
 - DHIS2 Tracker, Saugene
 - Generic Software Systems
 - Child Health Information Services
 - Biometrics papers

Date	Topic
Jan 7, 2015	Overview
Jan 14, 2015	Surveillance
Jan 21, 2015	Tracking
Jan 28, 2015	Medical records
Feb 4, 2015	Logistics
Feb 11, 2015	Patient support
Feb 18, 2015	Treatment support
Feb 25, 2015	Health worker support
Mar 4, 2015	Behavior change
Mar 11, 2015	Finance

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Assignment 3

- DHIS2 Assignment




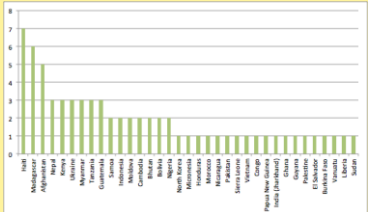
Questions to fahadp@cs

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Cold chain data reporting

- Distribution of countries
- Burden of Disease
- Cold chain reporting
 - Design a system for reporting 'up time' of all refrigerators
 - National surveillance problem
 - Indicator was identified
 - Challenges in getting data, transmitting data, interpreting data

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Cold chain data reporting

- Automated reporting linked to server
 - Real time temperature monitoring
- Reporting on temperature loggers
- Reporting of status in monthly report
- Link to existing structures
 - Monthly immunization reporting
 - Refrigerator repair
 - District immunization management



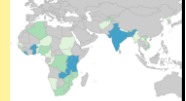
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Surveillance summary

- Aggregate data to evaluate the strength of the health system or to meet external requirements
- Indicators
- Data challenges
- Integrated vs. Parallel reporting
- DHIS2



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HISP Case Study

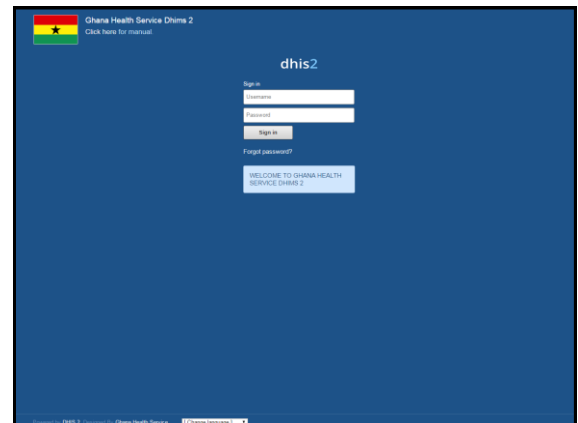
- Ghana



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Health Information Systems

- Challenges
 - Collection of irrelevant data
 - Poor data quality
 - Poor timeliness of reporting
 - Parallel and duplicate data collection
 - Low information usage and poor feedback
- Donor driven reporting
 - Lack of requested data elements in national reporting
 - Development of parallel reporting systems

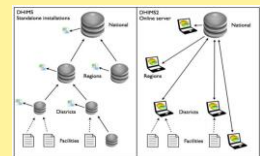
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DHIMS

- 2007: Roll out of District Health Information Management System
- 2008: Health Metrics Network (HMN), framework for integrated HIS
- 2011: Implementation of DHIMS2 in DHIS2



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DHIMS2 vs. DHIMS

- Centralization of expertise
 - Greater expertise needed, but can be centralize
- Improved data flow and reporting speed
- Increased access to information
 - No longer restricted to a local database
- Consistent national deployment
 - Avoid inconsistent development in different areas
- Substantial capacity development

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Why Open Source?



OpenMRS
Open Data Kit
DHIS2
Open LMIS
...

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Last mile data reporting

- Collecting data from health facilities
- Issues
 - Limits on infrastructure
 - Technical background of data reporters
 - Incentives of data reporters
 - Ownership of technology
 - Model for data collecting



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Internet

- Must be considered as an option
- Challenges of maintaining a computer at remote sites
- Need to support online/offline data entry



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Feature phone

- Java phones to run applications
- Interest in the technology has declined
- Projects generally targeted a small range of models as portability of applications a challenge
- Feature phones retain some market share as multimedia phones
- Series of mobile phone applications based on XForms



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Smart phone / ODK

- Growing interest in utilizing Smart Phones
- Cost and programmability drive interest in Android
- Open Data Kit
 - University of Washington developed system for data collection on mobile phones
 - Forms based application running on Phone
 - Back end system for aggregating submissions
 - Goal to make it easy for organizations to deploy survey tools on smart phones
 - Example: IHME deployment of verbal autopsy tool
 - Common approach, collect data on a tablet, and sync data by wifi when back in the office



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SMS

- Data submission by raw text messages, interpreted by server
- In many cases, it can be assumed everyone has access to an SMS phone
- Challenges if a large amount of data is required

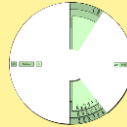


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SMS Wheel

- Attempt to simplify SMS reporting by giving a job aid to convert data into a numeric code with a checksum



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Paper to Digital

- Scan paper forms
- Allows entry on paper (which is easier)
- Reduces manual entry
- More later . . .



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Device ownership

- Personally owned versus provided devices
- Computers – generally facility devices
- Mobile phones
 - Personal
 - Cheaper to the project
 - Incentives to keep charged
 - Heterogeneous
 - Must support lowest common denominator
 - Provided
 - Can be costly
 - Substantial effort to manage
 - Security risks
 - Training
 - Allow uniform deployment environment
 - Can be a mismatch with target users
 - Potential for cross project utilization



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Who collects the data

- Health workers
- Dedicated data collectors
- Derived or automatically collected



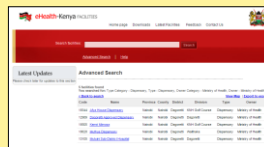
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Health Information Systems challenge: Generating a Master Facility List

- MFL – list of all health facilities in the country
 - Facility ID (Primary key)
 - Classification by services
- Best case: Kenya
 - <http://www.ehealth.or.ke/facilities/>



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Challenges in building MFL

- List all public health facilities
 - Determine which ones are active
 - Identify new facilities
 - Resolve duplicate names
- Determine other types of facilities to include
 - Private, Faith based
- Establish unique ID codes
 - Central administration of list

Laos Facility List, MOH vs NIP

0803001	80301	Phouang	ຮູບຮ່າງໄຫຼງ
0803002	80302	Thasouang	ຮູບຮ່າງຫ້າສາງ
0803003	80303	Khouak	ຮູບຮ່າງຄູ່ວາກ
0803004	80304	Napong	ຮູບຮ່າງນາປອງ
0803005	80305	Namso	ຮູບຮ່າງນາມສອ
0803006	80306	Ban Nam	ຮູບຮ່າງບ້ານນາມ
0804001	80401	Ban Thong	ຮູບຮ່າງບ້ານທອງ
0804002	80402	Houa Dineut	ຮູບຮ່າງຫຼວງດິນເນຸ້ວ
0804003	80403	Nakhong	ຮູບຮ່າງນາກອງ
0804004	80404	Phouang	ຮູບຮ່າງໄຫຼງ
0804005	80405	Phadang	ຮູບຮ່າງຟາດາງ
0804006	80406	Houaphouang	ຮູບຮ່າງຫຼວງຟາງ
0805001	80501	Phouane	ຮູບຮ່າງໄຫຼງຟາຍ
0805002	80502	Phoukai	ຮູບຮ່າງໄຫຼງຟາຍ
0805003	80503	Dong	ຮູບຮ່າງດອງ
0805004	80504	Holmai	ຮູບຮ່າງຫຼວງໄຫຼງ
0805005	80505	Houasouang	ຮູບຮ່າງຫຼວງສາງ
0805006	80506	Houa	ຮູບຮ່າງຫຼວງ
0805007	80507	Houa Phou	ຮູບຮ່າງຫຼວງຟາຍ
0806001	80601	Nong	ຮູບຮ່າງນອງ
0806002	80602	Nakham	ຮູບຮ່າງນາກອມ
0806003	80603	Phadon	ຮູບຮ່າງຟາດອນ
0806004	80604	Navan	ຮູບຮ່າງນາວານ
0806005	80605	Phadong	ຮູບຮ່າງຟາດອງ
0806006	80606	Phoua An	ຮູບຮ່າງໄຫຼງອານ
0806007	80607	Phouang	ຮູບຮ່າງໄຫຼງ
0806008	80608	Houa	ຮູບຮ່າງຫຼວງ

Registers

- What are registers
- Surveillance vs. Tracking vs. Medical Records

Register definitions

```

class ImmunizationRecord {
  int UniqueID;
  String Name;
  Date BirthDate;
  ImmunizationData immunizations;
}

ImmunizationRecord[] immunizationRegister;

```



Immunization cards



Immunization

- Routine immunization
- Track immunizations received and dates of immunization

Revised EPI Schedule	
Prev. No.	Yearly Distribution
BCG	1 dose
Polio (doses 1-3)	3 doses
DTaP	3 doses
MM2	1 dose
Typhoid	1 dose
Shingles	1 dose
MM3	1 dose
MM4	1 dose
MM5	1 dose
MM6	1 dose
MM7	1 dose
MM8	1 dose
MM9	1 dose
MM10	1 dose
MM11	1 dose
MM12	1 dose
MM13	1 dose
MM14	1 dose
MM15	1 dose
MM16	1 dose
MM17	1 dose
MM18	1 dose
MM19	1 dose
MM20	1 dose
MM21	1 dose
MM22	1 dose
MM23	1 dose
MM24	1 dose
MM25	1 dose
MM26	1 dose
MM27	1 dose
MM28	1 dose
MM29	1 dose
MM30	1 dose
MM31	1 dose
MM32	1 dose
MM33	1 dose
MM34	1 dose
MM35	1 dose
MM36	1 dose
MM37	1 dose
MM38	1 dose
MM39	1 dose
MM40	1 dose
MM41	1 dose
MM42	1 dose
MM43	1 dose
MM44	1 dose
MM45	1 dose
MM46	1 dose
MM47	1 dose
MM48	1 dose
MM49	1 dose
MM50	1 dose

Table 2: Immunization schedule, 2011	
Vaccine	Age of administration
BCG	At birth
DTaP-IPV	6 weeks, 10 weeks, 14 weeks
IPV	6 weeks, 10 weeks, 14 weeks
MM2	30 weeks
MM3	30 weeks
MM4	30 weeks
MM5	30 weeks
MM6	30 weeks
MM7	30 weeks
MM8	30 weeks
MM9	30 weeks
MM10	30 weeks
MM11	30 weeks
MM12	30 weeks
MM13	30 weeks
MM14	30 weeks
MM15	30 weeks
MM16	30 weeks
MM17	30 weeks
MM18	30 weeks
MM19	30 weeks
MM20	30 weeks
MM21	30 weeks
MM22	30 weeks
MM23	30 weeks
MM24	30 weeks
MM25	30 weeks
MM26	30 weeks
MM27	30 weeks
MM28	30 weeks
MM29	30 weeks
MM30	30 weeks
MM31	30 weeks
MM32	30 weeks
MM33	30 weeks
MM34	30 weeks
MM35	30 weeks
MM36	30 weeks
MM37	30 weeks
MM38	30 weeks
MM39	30 weeks
MM40	30 weeks
MM41	30 weeks
MM42	30 weeks
MM43	30 weeks
MM44	30 weeks
MM45	30 weeks
MM46	30 weeks
MM47	30 weeks
MM48	30 weeks
MM49	30 weeks
MM50	30 weeks

Infectious Disease

- Tuberculosis
 - Processes established for identification and treatment
 - Strict regimen of treatment
 - Two months of Isoniazid, Rifampicin, Pyrazinamide, Ethambutol
 - Four months of Isoniazid, Rifampicin
 - Testing at completion
- TB Record
 - Testing dates
 - Medication

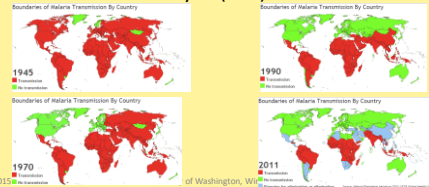


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Case tracking

- Identification of carriers of specific diseases
 - Malaria (for complete eradication)
 - Measles (exposure tracking)
 - Acute Flaccid Paralysis (AFP)



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Maternal Health

- Tracking mothers through pregnancy
- Registration of pregnant women
- Antenatal care visits



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Health use cases

- Surveillance
 - More accurate than reporting events
 - Better estimates of coverage
- Tracing defaulters
- Disease elimination
- Care and program planning
- Reporting
- Reminders
- Formalizing care
- Coordination of care across providers

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Challenges

- Unique identifier
- Biometrics
- Name resolution
- On-line, off-line mode
- Undocumented people
- Conflict zones
- Privacy

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How do we track people

- National or patient ID
 - How are IDs assigned
- Alternate IDs
 - Facebook, email, mobile number
- Mother's name
- Name
 - Name and birthdate
 - Name and birthdate and village
 - Name and birthdate and village and father's name
 - Name and birthdate and village and father's name and fathers village

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Patient ID

- Generate health ID
- Provide to patient on paper or a smart card



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Biometrics

- Some large initiatives based on biometrics
 - Finger prints, Iris
- Finger prints are challenging for young children



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Name resolution

- Additional challenges in the developing world
 - Lack of records
 - Spelling of names
 - Imprecise dates



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On-line, off-line access

- Standard synchronization problems
- In practice this is much harder than it should be



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Undocumented people

- Clearly, this is a complicated, political issue
- Delivery of services to people without official status
- Maintain separate registration
- Alternate means of identification

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Register/Tracker Implementations

- Many stand alone implementation
 - Simple database backend
- Extract information from a medical record system
- Extension of DHIS2
 - Tracker is a new data model

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