Slide 1

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

Winter 2015
Richard Anderson

1/21/2015 · University of Washington, Winter 2015

Slide 2 — 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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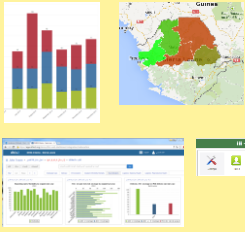
Slide 3 — Readings and Assignments

- 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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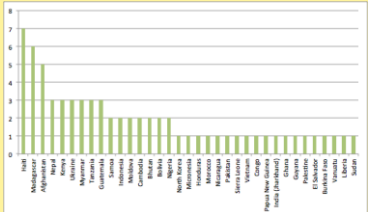## Slide 4 — Assignment 3

- DHIS2 Assignment

Questions to fahadp@cs

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Slide 5 — 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
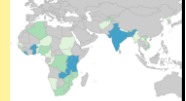 - District immunization management

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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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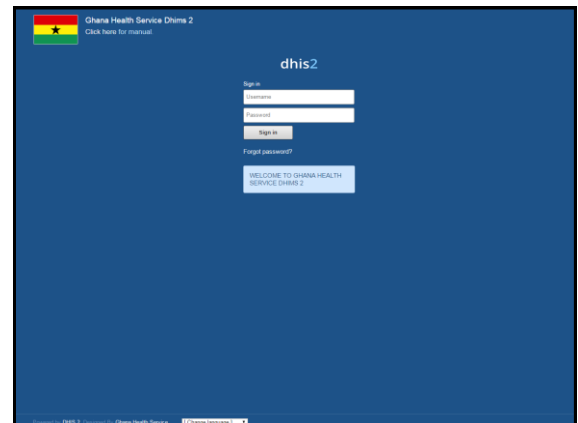
HISP Case Study

- 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
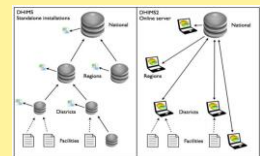 - Development of parallel reporting systems

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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

Why Open Source?

OpenMRS
Open Data Kit
DHIS2
Open LMIS
. . .

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

Internet

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

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

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

SMS

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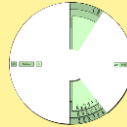- Challenges if a large amount of data is required

SMS Wheel

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

Paper to Digital

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

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

Who collects the data

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

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/
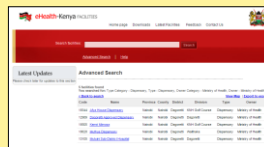
Challenges in building MFL

- 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

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

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
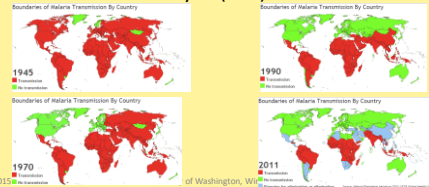- TB Record
  - Testing dates
  - Medication

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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

Biometrics

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

Name resolution

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

On-line, off-line access

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

Undocumented people

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

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