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

Readings and Assignments

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

<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
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<tr>
<td>Jan 7, 2015</td>
<td>Overview</td>
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Assignment 3

• DHIS2 Assignment

Questions to fahadp@cs

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
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

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

HISP Case Study

- Ghana

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

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
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

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Registers

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

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

Case tracking

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

Maternal Health

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

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

Challenges

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

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 father’s village
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