Mobile Data Collection and Reporting Across Multiple Developing African Countries

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Our Work Environment …

Agenda

- Project Characteristics and Requirements

- Acquisitions and configuration of tablets

- Data collection

  - Household Surveys

  - Household Listings (pre-survey)

- Use of ODK software and other capabilities on tablets

- Data reporting across multiple countries

- Capacity building with these technologies

Project Characteristics & Requirements

- Research Areas

- Environment

- Software/Device

- Data Flow

Project Characteristics & Requirements Research Areas

- 2 Key Projects:
    - FEEDBACK / FEED THE FUTURE with USAID
    - PHIA (Population Based HIV Impact Assessments) with ICAP (International Center for AIDS Care and Treatment Programs) and CDC
- International - mostly developing countries
- Over 300,000 households surveyed across 13 countries
- Planning for 100K's of surveys across 20 countries
- Utilize third party field staff with varying experience
- Considerations for in-country capacity building

Project Characteristics & Requirements Environment

- Often data collection is performed in developing areas

  - Limited Infrastructure

    - Power Availability

    - Communications Infrastructure

    - Travel Difficulty

  - Rough Conditions

    - Unpaved Roads

    - Dusty Environments

    - High Humidity

  - Seasonal Conditions (e.g. rainy/monsoon season)

Project Characteristics & Requirements Software/Device

Software

- Government clients like Open Source solutions!

- International partners like Open Source solutions!

- Original Hope – Software with a quick learning curve, a low barrier to entry, and without a need for highly sophisticated developers

Device

- Small, light-weight devices (tablets)

- Cost-effective devices (Android vs. Windows)

Project Characteristics & Requirements Data Flow

Acquire tablets and ship to country

→download data collection form from Westat

→collect household data on tablets

→ transfer data to Westat

→ identify subsample for survey

→ download survey form with subsample data

→ collect survey data from subsample

→ transfer data to Westat

→ process, report, analyze data

Tablet Acquisitions and Configurations

Tablet Acquisitions and Configurations

- Going from paper to tablets

- FEEDBACK – 1,100 Google Nexus 7 Android tablets acquired between 2012 through 2013

- PHIA – 1,700 Google Nexus 9 Android Tablets acquired between 2015 through 2016 (model is now discontinued)

- Optimal configurations to:

  1. Maximize performance

  2. Increase battery life

  3. Avoid distractions/conflicting applications

  4. Simplify tablet use

  5. Standard the look, feel, and functionality across all tablets

Data Collection
(1) Household Listings and (2) Household Surveys

Data Collection for Household Surveys

- Surveys in 13 African countries – Ethiopia, Kenya, Lesotho, Malawi, Mozambique, Nepal, Rwanda, Senegal, Swaziland, Tanzania, Uganda, Zambia, Zimbabwe

- Planning for surveys in more countries (Namibia, Cameroon, Ivory Coast, and maybe a few others)

- Length of some surveys are several hours

- Data used for a wide-range of assessments including rates of poverty, food expenditure levels, and HIV rates

Data Collection for Household Listings

- Household Listings (pre-survey) for 300,000+ households

- PHIA – one of the 1st projects to ever use tablets for household listings in Central Africa

- Significantly lower cost/time on data cleaning

- Routing/skip patterns on tablet pretty much force the user to get good data

Use of ODK Software on Tablets

Use of ODK Software on Tablets

- Open Data Kit (ODK) is an Open Source mobile data collection tool

- Developed and primarily maintained by graduate students of the University of Washington

- Actively being used by academia and a number of international research projects

- Initially funded by Google Research Award

- Is Java based. All source code available for review and/or mod.

- Runs on Android mobile devices

Use of ODK Software on Tablets
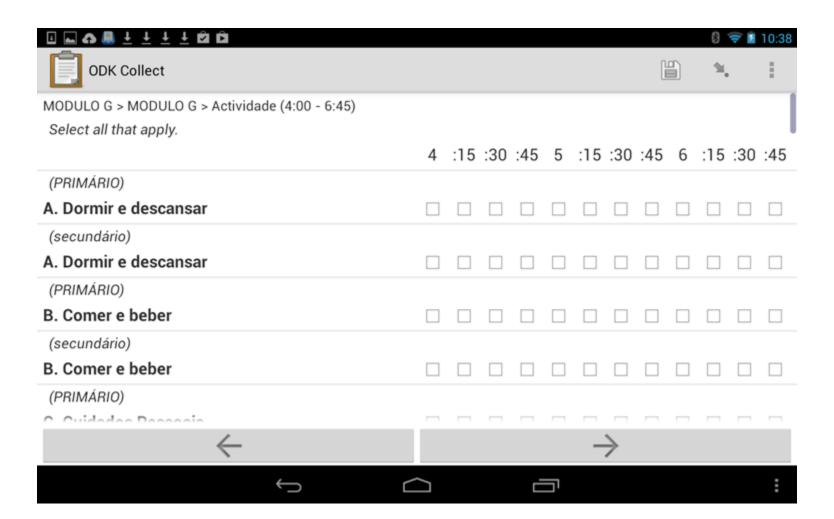
Functions ODK Supports Include:

- Instrument/form authoring

- Field data collection

- Transmission of collected data

- Centralized storage and management of data

Primary components of ODK

- ODK Build

- ODK Collect

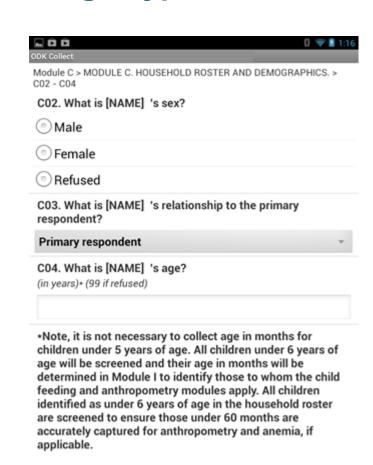- Aggregate Server

Use of ODK Software on Tablets

- Operates in a disconnected mode

- Non-proprietary solution allows for capacity building

- Source code available for modification if specialized capabilities are needed

- Data are securely transmitted to Westat's hosting facilities.

- Use of tool by data collectors doesn't require specialized application skills

- Data can be extracted and used in a variety of forms

ODK Capabilities
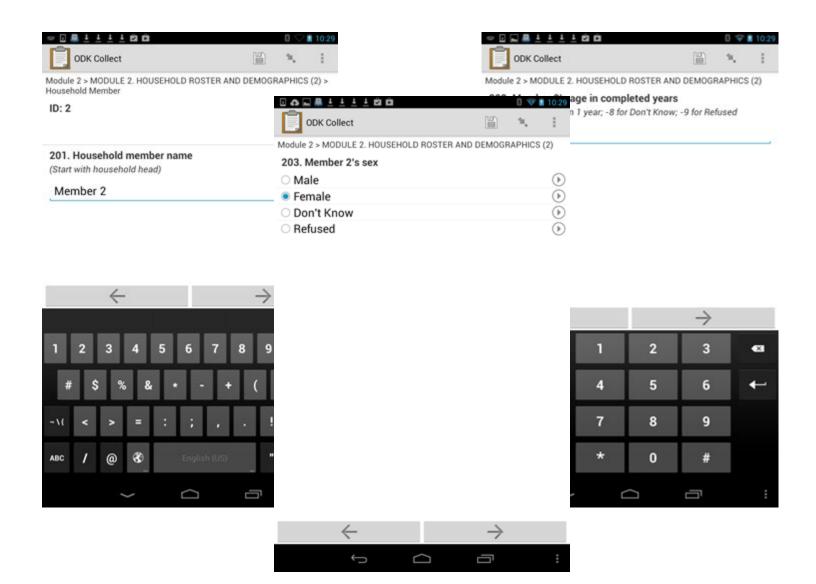## Multi-Language and Multi-Selection For Data Capture

ODK Capabilities
Wide Range of Data/Image Types

- Text

- Numeric

- Calculations

- Select one / multiple

- Date / Time

- Barcode

- GPS

- Photo / Video / Audio Capture

- More…

ODK Capabilities
Simple Data Entry & User-Friendly Interface

Barcode Reading Within a Tablet Survey

Barcode Reading Within a Tablet Survey

- Launch barcode app within ODK, and then return to ODK

- Used to read specimen labels

- A few challenges which required tablet upgrades (Google Nexus 7 → Google Nexus 9):

  - Lighting conditions

  - Quality of barcode reading

  - Ease of use

ODK at Westat
Staffing Skill Levels to Use ODK

- Junior Instrument Developers

- Senior Software Developers (Java skills are a plus!)

- Server Configuration & Security Management

- Field Teams – easy to use, low learning curve

ODK at Westat
Our Challenges

- No built in Case Management and Assignment

- Limited approach for Supervisor data review and QC

- Need for support of other project specific requirements

- More senior development than previously anticipated
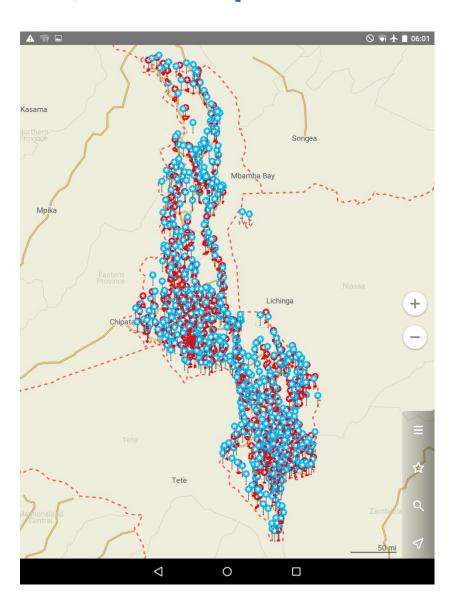
ODK at Westat
Our Contributions to the ODK Community

- Significant feedback on server size limitations

- Passing data from one tablet to another **(NEW)**

- ACASI capabilities **(NEW)**

- Variety of feedback on advanced technical issues
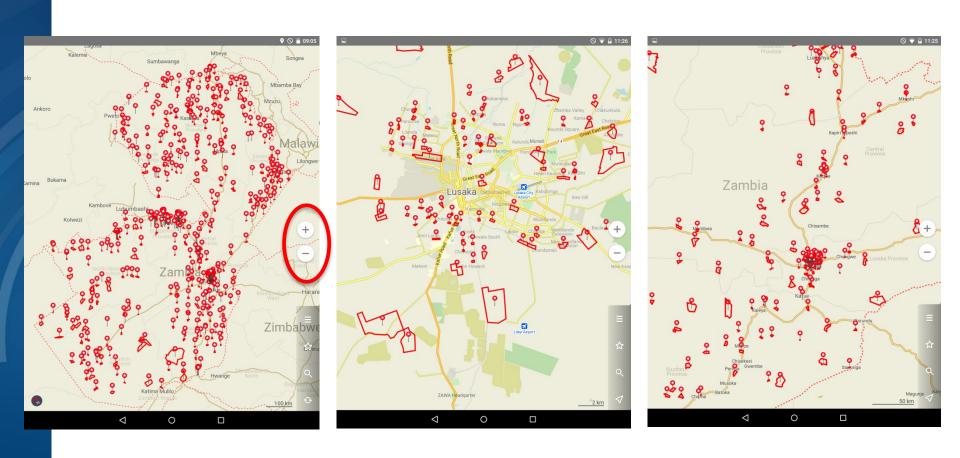
ODK at Westat
Thoughts on Overall Use

- Implementation of ODK surveys has been positive

- Unique needs should be identified early in the process

- Westat has stretched ODK to its limits in some ways

- Ease of use is highly dependent on complexity of survey

Other Tablet Capabilities
Use of Offline, GPS/Map Guidance on Tablets

OTHER TABLET CAPABILITIES
ZOOMING IN AND OUT OF THE MAP

You can (1) tap zoom buttons (+ or -) or you can (2) use your fingers to SWIPE in our out

Other Tablet Capabilities
Use of Offline, GPS/Map Guidance on Tablets

- MAPS.ME (MapsWithMe)

- Used to navigate to an Enumeration Area (EA) and visualize the surrounding location, such as EA boundaries and major streets or landmarks

- Household listing data added to maps

- Uses GPS capabilities

- Offline maps, don't need the internet

Data Reporting Across Multiple Countries

- Each country only sees their own data

- Sponsors (CDC and USAID) see all data

- Dashboard uploaded daily for monitoring / management

Data Reporting Across Multiple Countries

- Wide-range of metrics and indicator variables
- Data compared overall, by week, by team, and by lab

PHIA Monitoring Report: Lab Overall as of Week 26
Survey Start Date: 10/18/2015; Run Date: 07/12/2016

	All	Lab Location					
		Lab A	Lab B	Lab C	Lab D	Lab E	Lab F
Specimen Handling							
Total number of tubes received	54105	2	408	1636	6056	1555	3928
Total number of PTIDs associated with tubes received	27463	1	213	829	3014	799	2005
Number of aliquots transported out of lab	140170	4	1133	4355	15946	4179	10462
Satellite lab to Central	140170	4	1133	4355	15946	4179	10462
For PTIDs with 10ml or 4 ml, % with 5-6 aliquots (plasma and DBS cards)	19832 (96.28%)	0 (0.00%)	160 (96.97%)	610 (94.87%)	2212 (95.72%)	584 (96.85%)	1465 (95.07%)
% of 10 ml tubes with 3-4 plasma aliquots	19856 (96.45%)	0 (0.00%)	160 (96.97%)	610 (94.87%)	2226 (96.49%)	584 (96.85%)	1465 (95.07%)
% of 4 ml tubes with 2 DBS cards	20514 (99.62%)	0 (0.00%)	165 (100.00%)	640 (99.69%)	2284 (98.92%)	600 (99.50%)	1528 (99.16%)
% of 6 ml tubes with 4 aliquots (2 plasma, 2 DBS)	5099 (93.03%)	1 (100.00%)	29 (96.67%)	140 (93.96%)	532 (91.57%)	138 (92.00%)	309 (88.54%)
% of 6 ml tubes with 2 plasma	5105 (93.14%)	1 (100.00%)	29 (96.67%)	140 (93.96%)	533 (91.74%)	138 (92.00%)	309 (88.54%)
% of 6 ml tubes with 2 DBS cards	5415 (98.80%)	1 (100.00%)	29 (96.67%)	147 (98.66%)	577 (99.31%)	147 (98.00%)	347 (99.43%)
% of 1 ml tubes with 2 DBS cards	666 (49.37%)	0 (0.00%)	12 (66.67%)	20 (52.63%)	45 (35.71%)	31 (68.89%)	66 (59.46%)
% of 1 ml tubes with 1 DBS cards	482 (35.73%)	0 (0.00%)	6 (33.33%)	14 (36.84%)	40 (31.75%)	13 (28.89%)	36 (32.43%)
# of plasma and/or DBS aliquots marked QNS	4062	0	15	149	526	111	312
# of plasma and/or DBS aliquots marked SNC (e.g., entry error)	1583	0	0	40	331	12	102
# of plasma and/or DBS aliquots unexpected condition codes (not SAT, SHV, QNS, SNC)	511	0	8	24	55	22	62
Total number of PTIDs with any comments	889	0	1	17	115	6	50
Number of PTIDs that took over 1 day from time of specimen collection to placement in freezer*	41	0	0	1	38	0	1
Number of PTIDs with frozen time not recorded	521	0	0	0	431	0	45
Number of PTIDs with unstored SAT/SHV specimens	10	0	0	0	2	0	5

Capacity Building with These Technologies

- Active participation of in-country tablet configurations

- Training to manage tablets after we left the countries

- Training / working with in-country teams to review, reconcile, and resolve data issues

Mobile Technology Advancements Summary

- Many challenging and exciting advancements going on

- Was a big effort to move from the standard use of paper to survey data collection on tablets (PROCESS)

- Getting data faster and resolving data issues faster! (ALSO PROCESS)

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Questions?