Using Mobile Phones to Capture Polio Data

Lot Quality Assurance Sampling with Magpi and ESRI ArcGIS
Polio In Nigeria

2013:
22/31 cases worldwide

2012:
122/223 cases worldwide

As of May 2013
Lot Quality Assurance Sampling (LQAS)

• To combat continued transmission in Nigeria, GPEI introduced LQAS
• LQAS = sampling methodology used to classify geographical areas (lots) at “acceptable” or “not acceptable” levels of vaccination coverage.
• LQAS also used to assess campaign quality in Pakistan, DRC, Chad, and Afghanistan.
Lot Quality Assurance Sampling (GPEI LQAS Guideline)

LOT

Cluster → Cluster → Cluster

child → child → child → child

1 Cluster → 60 Children

1 Cluster → 10 Children

Number of unvaccinated children in the sample of 60 children:

- 0: Accepted at 90%, No action needed
- 3: Accepted at 80%, Review other indicators (e.g., in-process)
- 4: Accepted at 60%
- 8: Accepted at 60%
- 9: Accepted at 60%
- 19: Accepted at 60%
- 20: Not Accepted at 60%
- 21: Not Accepted at 60%, Consider re-doing the SIA
- 60: Not Accepted at 60%, Consider re-doing the SIA

Village/Settlement

1 child per household
Conducting an LQAS Survey

- Formerly on Paper
- Surveyor travels to assigned village
- Randomly selects 10 children per village to survey
- Checks fingermark for polio vaccination
- Reports data to state level → federal level for analysis
- Surveys could take 10 hours to complete and 2-3 weeks to compile data
Adaptation of Mobile Phones

- Introduction of mobile phones for collecting and transmitting LQAS data in 2011
- Magpi Data collection application on Android phones
- Improved collection, transfer, and analysis in four main ways
  - Fewer errors
  - Faster data collection
  - Faster data transmission
  - Faster data analysis
Signing in to Magpi.com

1. Sign in to your Magpi account at http://www.Magpi.com
2. Select “New” to create a new, unique form
Creating Forms in Magpi

Choose the type of question

9 types of questions

<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Label</td>
<td>Information questions/instructions</td>
</tr>
<tr>
<td>Plain text</td>
<td>Response in text</td>
</tr>
<tr>
<td>Integer</td>
<td>Response is integer</td>
</tr>
<tr>
<td>Decimal</td>
<td>Response can be decimal</td>
</tr>
<tr>
<td>Drop down</td>
<td>One option multi choice</td>
</tr>
<tr>
<td>Radio button</td>
<td>Yes/no multi choice</td>
</tr>
<tr>
<td>Check box</td>
<td>All that apply multi choice</td>
</tr>
<tr>
<td>Date</td>
<td>Response is date</td>
</tr>
<tr>
<td>GPS</td>
<td>Response is GPS coordinates</td>
</tr>
</tbody>
</table>
Form Adjustment

- Basic skip logic, constraints, calculations
- Question language and type can be changed
- Question order can be changed
- Current development of “push” feature
Magpi on Mobile Phones
Installing Magpi and Completing Forms

1. Install the application (via internet or USB transfer)
2. Load the form to the phone
3. Choose the form to fill out
4. Complete the survey on the phone
Sending Data to Server

Directly From Phone

Through phone’s SD card
Magpi Online - Data
Exporting Data from Web to Computer

1. Click on the boxes to the left of the data you want to export
2. Click on the export data link
3. Export into excel

The file should appear on your screen or in your computer downloads file
Using Magpi in the field
Nigeria Pilot

Global Polio Eradication Initiative
Lot Quality Assurance Sampling
**Pilot**

- **Phone application**: Magpi, March 2011
- **Study area**: four states (FCT, Kaduna, Kano and Zamfara)
Pilot

- **Results:** 90% (24/27) of LGAs reported by the end of the survey
- **Results:** all results came in faster on mobile phones than on paper (average 2-4 days vs. 2-3 weeks with then paper form).
- **Outcome:** The initiative has since been scaled-up to include 120 phones in all 10 high-risk northern states.
Process of Initiating Mobile Phone Program

1. Procurement of Android phones
2. Preparation of training materials and user manuals
3. Creation of forms online unique to each country
4. Discussion with local data team and staff members
5. Training of local supervisors and surveyors
6. Pilot study to test implementation
7. Scale-up when requested
Mapping LQAS Results

• Benefit of mobile phone use = addition of GPS points to surveys

• To visualize LQAS data in a geographic way, we use **ESRI ArcGIS** mapping software to identify areas of need in three different ways:
  1. Movement within the cluster for surveyor accountability
  2. At cluster level for classification of cluster based on unvaccinated children
  3. At LGA level for overall coverage quality at lot/administrative action level
Movement within cluster

3 GPS points within the cluster (10 children) to measure surveyor movement in the field for accountability

Can be done in google maps for country office / local supervisors (as below)
At cluster level – national view

1 GPS point at cluster level to demonstrate the number of unvaccinated children per cluster in five levels of classification:
0, 1-3, 4-7, 8-9 and 10 children unvaccinated out of 10 children surveyed.
At LGA level

Mapping at the LGA level to see overall coverage quality at the administrative/programmatic action level
Campaign Trends Through Mapping

Need to know:
• is program missing entire settlements or only children within settlements?

Conclusion:
• Suggests entire settlements are not being missed, but rather vaccination performance remains weak.
• Main Challenge = increase coverage within the settlements
### Geographic Distribution:

- 9 different LGAs, but only 4 northern states. Indicating local issues within a relatively small geographic area.

### Campaign Trends Through Mapping

<table>
<thead>
<tr>
<th>State</th>
<th>LGA</th>
<th>State</th>
<th>LGA</th>
</tr>
</thead>
<tbody>
<tr>
<td>November</td>
<td>March</td>
<td>November</td>
<td>March</td>
</tr>
<tr>
<td>Kaduna</td>
<td>Birnin gwari</td>
<td>Kaduna</td>
<td>Lere</td>
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<td>Bauchi</td>
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<td>Dange Shuni</td>
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<td>Zaria</td>
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<tr>
<td></td>
<td></td>
<td>Sokoto</td>
<td>Tambuwal</td>
</tr>
</tbody>
</table>
Conclusion

• Using mobile phones has good implications for field level data collection and transmission

• Has been welcomed by countries – Nigeria, Pakistan, Afghanistan

• Magpi has good support network, but we do encounter some issues in terms of sending and exporting data

• Use of GPS is great bonus to the program for geographically identifying program trends
Backup Slides
# Process of LQAS Round

<table>
<thead>
<tr>
<th>Day</th>
<th>Action</th>
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</thead>
<tbody>
<tr>
<td>After LQAS completed → week before vaccination campaign</td>
<td>Phones are held at the Lot level or Federal Level</td>
</tr>
<tr>
<td>Week before campaign</td>
<td>Phones are distributed to the lot level supervisors and then to LQAS surveyors</td>
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<tr>
<td>Week before campaign</td>
<td>New surveyors must be trained on mobile phone use</td>
</tr>
<tr>
<td>Week before/during campaign</td>
<td>Test data is sent from states to ensure forms and phones are working correctly</td>
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<tr>
<td>Over 2-4 days, 1 day after campaign is completed</td>
<td>Surveyors conduct data collection on mobile phones over period of 1-2 days</td>
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<tr>
<td>During LQAS (2-4 day period)</td>
<td>Preferably, after each form is completed (1 cluster = 10 children), surveyor sends data to central server</td>
</tr>
<tr>
<td>End of LQAS collection day</td>
<td>Any unsent data collated and sent from local / state office</td>
</tr>
<tr>
<td>During LQAS / final day of LQAS</td>
<td>Data is exported from Magpi server site and cleaned</td>
</tr>
<tr>
<td>1 week after LQAS completed</td>
<td>Data is compiled with paper data</td>
</tr>
<tr>
<td>1-2 weeks after LQAS completed</td>
<td>Analysis is conducted and sent to all levels of organization</td>
</tr>
</tbody>
</table>

Areas that still require extra time – paper based