Potholes and Progress
Deploying ChildCount+
in Ruhiira, Isingiro District

Emmanuel Toko, eHealth Specialist
Henry Corrigan-Gibbs, Technology Volunteer
Outline

• Background on Ruhiira site and MVP
• Problem statement
• Our solution: ChildCount+
  – Overview
  – Progress
• Challenges and Concerns
The Millennium Villages Project

- Community-level approach to achieve the MDGs by 2015
- A total of 14 sites across sub-Saharan Africa
- A joint project of:
  - The Earth Institute at Columbia University
  - Millennium Promise
  - UNDP
  - Government of Uganda
Technical support

Fundraising and donor relations

Implementation and management

Facilities and financial support
## Ruhiira: Background

<table>
<thead>
<tr>
<th><strong>Geography</strong></th>
<th>Hills draining into river valleys, 1,350 to 1,850 meters in elevation</th>
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<tbody>
<tr>
<td><strong>Population</strong></td>
<td>60,000</td>
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<tr>
<td><strong>Average Income</strong></td>
<td>Ruhiira: $250 per year</td>
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<td>Uganda: $453 per year (WB 2008)</td>
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<td><strong>Maternal Health</strong></td>
<td>42% of births attended by skilled health personnel (2009)</td>
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</tbody>
</table>
Ruhiiira: Health System

- Six health facilities
  - Including one level IV facility with operating theatre
  - Led by Dr. Martins Okongo and Dr. Emma Atuhairwe

- Community Health Workers
  - 48 CHWs each covering a specific set of households
  - Can administer RDTs, anti-malarials, HIV tests, etc.
  - Focus on preventative care
  - Refer pregnant women to HCs for antenatal care, postnatal care, and delivery
Problem Statement
Problem Statement

• Some residents do not take advantage of the health centers (e.g., for antenatal care)
  – Health centers can be far away (up to 5 km)
• Post-referral follow-up visits are rare
• Health managers have little knowledge about community health overall
  – e.g., it’s hard to measure the number of malaria cases outside of health clinics
One Solution: SMS-Based System

• Have CHWs submit household visit summaries to a server by SMS
• Send **SMS alerts** to CHWs reminding them about follow-up visits, ANC visits, etc.
• Generate **aggregate statistics** on community health based on data collected by SMS
• Track **CHW performance** using SMS activity
Technical Prerequisites

- Through a partnership with Zain/AirTel, Ruhiira has cell coverage
- CHWs in Ruhiira have basic cell phones
- Charging points are available (if not nearby)
ChildCount+

• Based on RapidSMS
  – Developed using Python and Django framework
• Development led by Matt Berg (Earth Institute, Columbia University) together with an international team of programmers
• Designed for use in all sites but currently being used in Kenya and Ruhiira
CHWs (in field)

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Forms by SMS

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Alerts by SMS

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Printed Reports
(to CHWs and Clinicians)
Forms

• During registration, each individual is assigned a unique alphanumeric health ID

• Subsequent health forms use the health ID to identify the patient

• CHWs submit forms:
  – For every household visit
  – To report “danger signs” (e.g., fever) in an individual
  – Whenever they dispense medication
**ChildCount+ Form A: REGISTRATION**

Focus on: Household Heads, Children Under 5, and Pregnant Women

**GENERAL REGISTRATION:**  For any household member without a HEALTH ID that needs to be recorded in the CHW.

<table>
<thead>
<tr>
<th>Date</th>
<th>HEALTH ID</th>
<th>General Registration</th>
<th>Location Code</th>
<th>First Name</th>
<th>Family Name [Sur-name]</th>
<th>Sex (M-F)</th>
<th>Birth Date [DDMMYY]</th>
<th>Age [m.y]</th>
<th>Household Head HEALTH ID</th>
<th>Mother's HEALTH ID</th>
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**DEATH --or-- STILLBORN / MISCARRIAGE:**

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<tr>
<th>Death with HEALTH ID</th>
<th>Death without HEALTH ID</th>
<th>Stillbirth</th>
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# ChildCount+ Form A: REGISTRATION

Focus on: Household Heads, Children Under 5, and Pregnant Women

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Every line of the table becomes an SMS message or is entered directly into a computer.

**DEATH --or-- STILLBORN / MISCARRIAGE:**

<table>
<thead>
<tr>
<th>Death with HEALTH ID</th>
<th>Death without HEALTH ID</th>
<th>Stillborn</th>
<th>Miscarriage</th>
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</table>
Reports and Alerts

• CHWs and health managers get reports
  – List of members in the target community
  – “Operational Reports” on relative CHW performance and follow-up times
• Once the SMS is system is running:
  – CHWs will get daily reminders to follow up on referrals
  – Reports will be instantly updated
Progress

- System deployed
- Initial registration complete
- Generated first reports
- SMS system running
- Long-term improvement in health
Benefits
(in order of decreasing certainty)

• **Reporting**: ChildCount can easily produce aggregate health data for the community

• **CHW management**: SMS submissions provide a way to monitor CHW activity day by day

• **Health outcomes**: Reports and SMS alerts have the *potential* to improve health delivery outside of the clinics
Discussion
Challenges

• Tension between what’s right for Ruhiira and what will work for all 14 MVP sites
  – Raises questions about scalability

• Training the CHWs
  – Time-intensive

• Technical problems
  – Software is not yet mature
  – Small glitches can cause large problems for data entry clerks
What keeps us awake at night

• Additional burden on CHWs
• Privacy of health information
  – Some data collected is quite sensitive
• Cost of SMSs (at $0.05 per msg, it’s expensive)
  – Web interface would be cheaper per byte but has other costs (expensive handsets, training, monitoring CHW bandwidth usage, etc.)
• Whether ChildCount+ will improve patient care and health outcomes
  – There are strong opinions on all sides
What we would do differently

• Involve local staff (top to bottom) in design process very early on
  – Solicit more input from CHWs, data clerks, and on-site doctors before deployment
  – Would allow us to identify and avoid deployment challenges

• Delay deployment until software is tested and completely stable
  – Once data entry and training begins, it’s hard to change methodology
Open Questions

• How can we quickly get comprehensive reports to the CHWs?
  – SMSs are short (<160 characters)
  – Trucking paper to the site is expensive and slow
  – Android/Java phones require large investment in app devm’t and training

• How can we define and measure success?
  – This is probably a problem for someone “above our pay grade”

• Would a well-structured paper system be better suited to the problem we want to solve?
Conclusions
Conclusions

• ChildCount+ is on the way to deployment
• There will likely be some big benefits
  – Real-time view of community health
  – CHW accountability
• We are not yet sure about how these benefits will compare to the costs
  – SMS fees
  – Added CHW workload
Many thanks to...

- Dr. Martins, Dr. Emma, and Matt Berg,
- Dr. Anneli Milen for inviting us,
- the CHWs for tolerating all of our training sessions,
- the staff of MVP Ruhiira,
- the Gordon Grand Fellowship for buying Henry’s plane ticket, and
- all of you for listening!
ChildCount+ Form B: Household Visit Form
To Record Each Household Visit

<table>
<thead>
<tr>
<th>Notes</th>
<th>MANDATORY EVERY HH VISIT</th>
<th>MANDATORY EVERY HH VISIT</th>
<th>Conditional: If Necessary</th>
<th>Cond.</th>
<th>Optional: Routine</th>
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CHW Name: ________________
CHW Number: _____

Notes, Date, Household Head HEALTH ID, HH Visit - All Households, Any HH Member Available (Y-N), Number of Children Under-5 seen (BF, BN, FP, IM, NUT, SH), Counseling and Advice, Other Sick Members Section [anyone not recorded in Form C], Number of other sick members seen during visit?, Number of RDTs used on other sick members? Number of RDT positive cases for other sick members?, Number of other sick members receiving anti-malarial treatment?, Number of Women given birth control Pills by CHW during visit, Number of Women Aged 15-49 seen during this visit, Number of these Women currently using modern family planning, Primary Family Planning Method used [Record primary method for each woman], (CD, IUD, IJ, IP, PL, ST)
# ChildCount+ Form C: CONSULTATIONS OF INDIVIDUALS with HEALTH ID

**Focus on:** Newborns, Children Under 5 years, and Pregnant Women

<table>
<thead>
<tr>
<th>Follow-up</th>
<th>Current Danger Signs</th>
<th>Routine Care</th>
<th>Routine / Conditional</th>
<th>Conditional: If Necessary</th>
<th>Referral</th>
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**Notes**

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<th>Date</th>
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**Follow-up Visit Section:**
- Has patient’s condition improved since last visit (Y/N-U/L)
- Did patient visit a clinic or hospital since last CHW visit (Y/N-U/P)

**Current Danger Signs:**
- Pregnancy Check-up
- Month of pregnancy (1-9)
- Newborns since last ANC visit [0 = less than 7 days]
- Neonatal Check-up (0-28 days)
- Under-1 Check-up (0-11 months)
- Breast-feeding Only (Y/N-U)
- Nutrition Section: Under-5
- MUAC Measurement [0 = No measurement]
- Oedema (Y/N-U)
- Weight in KG (Optional)
- Fever Section
- RDT Result Positive (Y/N-U)
- Medicine Given Section
- Medicine Given (AM, R, Z)

**Referral to Clinic Section:**
- Referral to Clinic (A-E-B-C)

**Referral:**
- +R

**CODES:**
- AM = Anti-malarial drugs
- C = Convenient Referral
- N = No / Negative
- U = Unsure / Don’t Know
- A = Ambulance Referral
- E = Emergency Referral
- P = Currently inpatient at facility
- Y = Yes
- B = Basic Referral (24 hours)
- L = Patient unavailable
- R = ORS
- Z = Zinc

[ChAdCount+ v2.1]
Cost of SMSs

• 48 CHWs, each with 15 visits/week = 720 visits/week
• ~7 SMSs total/visit = 5040 SMS/week
• 0.05 USD/SMS = $252/week
• Approximate annual cost: 13,000 USD