ABC, 123: Can you Text me Now?
(Jenny C. Aker, Tufts, Christopher Ksoll, Oxford ;
Travis Lybbert, UC Davis)

CSAE Conference
March 22, 2010
Adult Literacy Rates in Sub-Saharan Africa, 2009

Adult Literacy Rates in Africa

Source: UN Human Development Report, 2009
Enrollment Ratio in Sub-Saharan Africa, 2009

Source: UN Human Development Report, 2009
Mobile Phone Coverage, 1999

Source: GSMA 2009
Mobile Phone Coverage, 2008

Source: GSMA 2009
Mobile Phone Adoption

• If mobile phones make literacy skills more useful, can they also be used to improve literacy outcomes?
Motivation

Bakin Birgi (Monday)

Zinder (Thursday)

Tanout (Friday)

Niamey (Sunday)

65 km ~ 2 min

20 km ~ 1 hour

750 km ~ 2 min
Can Mobile Phones Promote Literacy?

- Goal: Assess the impact of mobile phone technology on adult literacy and numeracy in Niger
  - Develop a mobile phone literacy project in Niger
  - Exploit the experimental nature of the project to measure its impact upon adult literacy rates
  - Investigate the impact on the short- and long-term

- Primary Dataset
  - Literacy test results immediately after the first year of the project and six months’ later
Preview of Findings

- Learning how to use a mobile phone during literacy classes increases math scores
  - The effect is not significant for writing scores for the first year of the project
  - Learning outcomes depreciate six months after classes end
  - The effect on math remains six months after the classes end
- Learning heterogeneity across regions
- The results suggest that the project could be sustainable in the longer-term
Overview

• Education and economic development
• The Mobile Phone Literacy Project
• Experimental design
• Fieldwork and dataset
• Empirical strategy
• Preliminary evidence
Related Literature

• Education and economic outcomes (Duflo 2004, Case 2006, Blunch and Pörtner 2009)
• Determinants of education adoption (conditional cash transfers, subsidies, educational inputs)
• Modern technology and skill acquisition (Linden, Banerjee and Duflo 2003)
• Skills depreciation after unemployment
Literacy Programs in sub-Saharan Africa

• Adult literacy programs have limited impact
  o Adult literacy programs improved literacy below 20 percent in the 1970s
  o This improved to 60 percent in the 1980s, but with skills loss (Abatzi 2002)
  o No reading materials in local languages – limited incentives

• Low education outcomes for adults have important development consequences
  o Intergenerational spillovers
  o Limits information campaigns
Mobile Phones and Literacy: Project ABC (*Alphabétisation de Base par Cellulaire*)
Project ABC: Literacy

- Two years of courses for full literacy cycle in indigenous languages (Hausa and Zarma)
- Ten months of literacy training
  - Courses held January through May each of year
  - June through December are off due to the agricultural season
  - 5 courses per week, three hours per day (split between men and women)
  - Taught by community literacy teachers
- First year: Basic literacy and numeracy
- Second year: Thematic topics (agroenterprise and health)
- Fifty literacy participants per village (25 men, 25 women)
Project ABC Approach

• Developed and implemented in collaboration with Catholic Relief Services and the Ministry of Non-Formal Education

• Use simple mobile phones as a learning tool to allow participants to practice reading and writing in their local languages via SMS

• Reinforce the importance of functional literacy by targeting producers’ groups with a common economic function
Project ABC Approach

Projet ABC:
Yàki da jahilci ta wurin amfani da salula

Projet ABC:
Sijiraa kaŋ ga naŋ borey ma cawyaŋ dondon nda Kambe ra Talfono
Project ABC Approach

- Learn where to find numbers and letters on mobile phone handset
- Learn how to send and receive SMS
- Participants are organized into solidarity groups to access mobile phones (leased)
Project ABC Approach
Experimental Design

• Implemented in over 100 villages in two regions (Dosso and Zinder) of Niger

• **Randomized phase-in over time and random assignment of villages to Project ABC and normal literacy program**
  
  o Half of the villages began the program in 2009, the rest in 2010
  
  o Half of the villages in each year participated in the mobile phone literacy project
  
  o ABC starts at least 2 months after the literacy project starts (so only had two months of ABC in 2009)
Experimental Design

Compare impact on literacy rates and other outcomes in ABC and non-ABC villages

Project ABC Villages

Non-ABC Villages
Fieldwork

• Household baseline survey in January 2009
  o Selection of literacy participants
  o Survey in over 100 villages, 11 households per village~1100 households

• Literacy participant pre-test prior to the start of classes (January 2009) -- 3500 students

• Literacy participant post-tests in June 2009

• Household and literacy tests in January 2010

• Final evaluation January 2011
Literacy Tests

**Sabon shiga:**

Matsayi na 1 (Niveau 1): o t i m u e t a b i

Matsayi na 2 (Niveau 2): l a d i r o l e b o n i k u d i

Matsayi na 3 (Niveau 3): m a i r a n i d a k a g o n a k a s u w a

Matsayi na 4 (Niveau 4): R a b i t a s h a r e h i l i n g i d a

Musa manomi ne mai aiki da takin zamani.

Yana samun amfani da dama kowace shekara
Literacy Tests

• Level 0 (beginner): The individual is unable to write down letters of the alphabet correctly

• Level 1: Correctly writing down eight letters and syllables of the local language alphabet, as well as simple two-syllable words;

• Level 2: Correctly writing two-syllable words and short sentences

• Level 3: Correctly writing two complete sentences with more complex word patterns.
Numeracy Tests

• Level 0 (beginner): The individual is unable to recognize numbers
• Level 1: The individual can recognize numbers and complete simple addition and subtraction.
• Level 2: Successful completion of addition, subtraction, multiplication and division problems.
• Level 3: The student is able to complete math word problems.
Literacy and Numeracy Before and After

Literacy Comparison

Numeracy Comparison
Identification strategy

\[ test_{ivt} = \alpha_0 + \beta_1 ABC_{ivt} + \beta_2 year_{ivt} + \]

\[ \beta_3 ABC_{ivt} \times year_{ivt} + \gamma X_{ivt} + \theta_v + \epsilon_{ivt} \]

where:

- \( i \) refers to the individual, \( v \) the village, and \( t \) the time period
- \( TEST_{iv,t} \) is test scores, either absolute value, levels or normalized test scores
- \( ABC_s \) is an indicator variable if school \( s \) is under the scholarship program at time \( t \)
- \( \theta_s \) are village fixed effects.
# Balance of Pre-Program Covariates

## Table 1: Descriptive Statistics (by Treatment Status)

<table>
<thead>
<tr>
<th></th>
<th>Comparison</th>
<th>ABC</th>
<th>Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Dosso</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>41.84</td>
<td>41.13</td>
<td>0.71</td>
</tr>
<tr>
<td>Head of Household</td>
<td>0.54</td>
<td>0.49</td>
<td>0.05</td>
</tr>
<tr>
<td>Farmer is Resp's main occupation</td>
<td>0.75</td>
<td>0.78</td>
<td>-0.03</td>
</tr>
<tr>
<td>Housewife is Resp's main occupation</td>
<td>0.23</td>
<td>0.21</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of HH members</td>
<td>9.17</td>
<td>8.92</td>
<td>0.25</td>
</tr>
<tr>
<td>Percent Children &lt;15 with at least some primary educ</td>
<td>0.71</td>
<td>0.60</td>
<td>0.12 **</td>
</tr>
<tr>
<td>Number of assets owned</td>
<td>10.07</td>
<td>9.67</td>
<td>0.39</td>
</tr>
<tr>
<td>Number of houses owned</td>
<td>3.36</td>
<td>3.03</td>
<td>0.33</td>
</tr>
<tr>
<td>Resp has used Mobile since harvest</td>
<td>0.65</td>
<td>0.63</td>
<td>0.01</td>
</tr>
<tr>
<td><strong>Panel B: Zinder</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>34.53</td>
<td>34.18</td>
<td>0.35</td>
</tr>
<tr>
<td>Head of Household</td>
<td>0.47</td>
<td>0.50</td>
<td>-0.03</td>
</tr>
<tr>
<td>Farmer is Resp's main occupation</td>
<td>0.83</td>
<td>0.85</td>
<td>-0.02</td>
</tr>
<tr>
<td>Housewife is Resp's main occupation</td>
<td>0.15</td>
<td>0.14</td>
<td>0.01</td>
</tr>
<tr>
<td>Number of HH members</td>
<td>7.68</td>
<td>7.23</td>
<td>0.45</td>
</tr>
<tr>
<td>Percent Children &lt;15 with at least some primary educ</td>
<td>0.55</td>
<td>0.54</td>
<td>0.02</td>
</tr>
<tr>
<td>Number of assets owned</td>
<td>9.24</td>
<td>8.40</td>
<td>0.84</td>
</tr>
<tr>
<td>Number of houses owned</td>
<td>3.10</td>
<td>2.92</td>
<td>0.19</td>
</tr>
<tr>
<td>Resp has used Mobile since harvest</td>
<td>0.50</td>
<td>0.44</td>
<td>0.05</td>
</tr>
</tbody>
</table>
## Literacy Results

### Table 3: Effects of Cell Phone Literacy Program: DD Results

<table>
<thead>
<tr>
<th>Panel A: Literacy</th>
<th>(a) ABC villages</th>
<th>(b) Control villages</th>
<th>(c) ABC-Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 6-month results</td>
<td>1.15</td>
<td>1.01</td>
<td>0.14</td>
</tr>
<tr>
<td>2 Baseline</td>
<td>0.08</td>
<td>0.08</td>
<td>-0.01**</td>
</tr>
<tr>
<td>3 6-month results - baseline</td>
<td>1.07 (0.08)**</td>
<td>0.93 (0.08)**</td>
<td>0.14 (0.11)</td>
</tr>
</tbody>
</table>
### Numeracy Results

#### Table 3: Effects of Cell Phone Literacy Program: DD Results

**Panel B: Numeracy**

<table>
<thead>
<tr>
<th></th>
<th>(a) Treatment</th>
<th>(b) Control</th>
<th>(c) Treatment-Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1.43</td>
<td>1.31</td>
<td>0.12</td>
</tr>
<tr>
<td></td>
<td>(0.10)</td>
<td>(0.04)</td>
<td>(0.09)**</td>
</tr>
<tr>
<td>2</td>
<td>0.10</td>
<td>0.17</td>
<td>-0.06</td>
</tr>
<tr>
<td></td>
<td>(0.04)</td>
<td>(0.04)</td>
<td>(0.04)</td>
</tr>
<tr>
<td>3</td>
<td>1.33</td>
<td>1.15</td>
<td>0.18</td>
</tr>
<tr>
<td></td>
<td>(0.07)**</td>
<td>(0.06)**</td>
<td>(0.09)*</td>
</tr>
</tbody>
</table>
### Table 4: Heterogeneity in short-run effects across Region and Sex

#### Panel A: Effects on literacy

<table>
<thead>
<tr>
<th></th>
<th>Whole Sample (1)</th>
<th>Men Only (2)</th>
<th>Women Only (3)</th>
<th>Dosso (4)</th>
<th>Zinder (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC village * 5 month scores</td>
<td>0.128 (0.109)</td>
<td>0.103 (0.129)</td>
<td>0.135 (0.152)</td>
<td>0.107 (0.131)</td>
<td>0.074 (0.177)</td>
</tr>
<tr>
<td>N</td>
<td>4908</td>
<td>2444</td>
<td>2464</td>
<td>3470</td>
<td>1438</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.22</td>
<td>0.24</td>
<td>0.19</td>
<td>0.20</td>
<td>0.27</td>
</tr>
</tbody>
</table>

#### Panel B: Effects on numeracy

<table>
<thead>
<tr>
<th></th>
<th>Whole Sample (1)</th>
<th>Men Only (2)</th>
<th>Women Only (3)</th>
<th>Dosso (4)</th>
<th>Zinder (5)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC village * 5 month scores</td>
<td>0.172 (0.093)*</td>
<td>0.206 (0.125)</td>
<td>0.132 (0.132)</td>
<td>0.235 (0.115)**</td>
<td>-0.005 (0.169)</td>
</tr>
<tr>
<td>N</td>
<td>4908</td>
<td>2444</td>
<td>2464</td>
<td>3470</td>
<td>1438</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.32</td>
<td>0.30</td>
<td>0.34</td>
<td>0.32</td>
<td>0.31</td>
</tr>
</tbody>
</table>
## Dynamic Effects

### Table 5: Impact of ABC on Long-Run Literacy and Numeracy

#### Panel A: Effects on literacy

<table>
<thead>
<tr>
<th></th>
<th>Whole Sample (1)</th>
<th>Men Only (2)</th>
<th>Women Only (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC village * 10 month scores</td>
<td>0.167 (0.128)</td>
<td>0.193 (0.203)</td>
<td>0.145 (0.138)</td>
</tr>
<tr>
<td>N</td>
<td>1653</td>
<td>1446</td>
<td>890</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.23</td>
<td>0.16</td>
<td>0.06</td>
</tr>
</tbody>
</table>

#### Panel B: Effects on numeracy

<table>
<thead>
<tr>
<th></th>
<th>Whole Sample (1)</th>
<th>Men Only (2)</th>
<th>Women Only (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ABC village * 10 month scores</td>
<td>0.210 (0.116)*</td>
<td>0.260 (0.153)</td>
<td>0.142 (0.160)</td>
</tr>
<tr>
<td>N</td>
<td>1654</td>
<td>1448</td>
<td>891</td>
</tr>
<tr>
<td>R-squared</td>
<td>0.40</td>
<td>0.42</td>
<td>0.38</td>
</tr>
</tbody>
</table>
Conclusion

• Preliminary results indicate that literacy classes are successful in increasing literacy and numeracy of poor populations
• These gains quickly depreciate after the end of classes
• Mobile phones have large impact on numeracy in the short-term
• These impacts are persistent six months after the end of classes
Directions for Future Research

• Further identify the effect after another round of literacy tests (June 2010) and higher sample

• Look into heterogeneity of impacts (men and women, young and old)

• Identify the channels of the impact
  o Do mobile phones serve as a better teaching tool?
  o Is there an incentive to acquire skills required to derive (maximum) benefits from a technology?
  o Do mobile phone courses improve student and teacher attendance (or reduce attrition)?