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Do SMS Text Messaging and SMS Community Forums Improve Outcomes of Adult and Adolescent Literacy Programs? Evidence from the *Jokko Initiative* in Senegal

Final Report, September 2010

By Theresa Beltramo and David I. Levine[1]

Being able to reach the world as if the world was just a round dance: easy, well-thought, a gain of time. Tostan, we are grateful.
-Message sent by a participant to the RapidSMS Community Forum, August 2009

[1] This report benefited from background papers by Issa Gueye, "Cell Phone Usage and Literacy"; Leigh Jaschke, "Evaluating Adult Literacy Programs- A Core Competency Based Approach"; and Cheikh Sidaty Ndiaye, "RapidSMS 'SMS Community Forum' Report on Messages Sent and Usage of System by Participants." A special thanks is in order for Issa Gueye the primary Research Assistant and Field Supervisor for this pilot project and Cheikh Sidaty Ndiaye for his excellent research assistant and field team lead during this project. The team is indebted to Cody Donahue and Guillaume Debar from Tostan for their excellent research leadership. This project has been funded by UNICEF New York and UNICEF Senegal. See: www.jokkoinitiative.org

Introduction

The most recent two decades in Senegal have been witness to a large shift of social communication norms, accessibility of information communication technologies (ICTs), and growth of ICT networks. Use of mobile phones in rural areas in Senegal is substantial– the penetration rate is 44.6% in 2008 (ITU, 2009). Increased cell phone usage is matched by expanding network coverage and the emergence of several competing operators.[2] Basic use of mobile phones in rural areas is widespread, but sending SMS and accessing the Internet by mobile phone is much less common (ITU, 2009).

The possibility to expand SMS usage in rural communities throughout Senegal is large as text messaging remains the least expensive form of communication over distance. In addition, a significant portion of the rural Senegalese population migrates for work (on average each household reported 5 of their family members currently living and working outside Senegal). Senegalese out-migration flows are dominated by men ages 15-34 and thus this youthful population is of prime age for developing communication patterns which incorporate text messaging (UNDP Human Development Statistics, 2009)[3]. SMS text messaging can provide a low-cost solution to communicate with the diaspora. (see Appendix 3). However, the usage of mobile phones as a communications strategy can only be functional if all members of the community understand how to use, and have access to, a cell phone, as well as read and write messages.

A very high share of women and teenage girls in rural Senegal lack both access to a mobile phone and the literacy skills needed to text message. In our study, only one in 8 female respondents owned a cell phone, less than half the rate for men. In addition, over 40% of the female respondents had no literacy or numeracy skills, again almost double the rate for men. Thus, the gender bias in literacy and numeracy skills and cell phone ownership must be addressed for equitable inclusive growth using ICT.

We report on a pilot study in 20 communities of adding cell phone literacy and a free "SMS Community Forum" to an adult literacy and numeracy program. Overall results are promising, but the SMS Community Forum is not yet achieving all of its goals.

The Intervention

The NGO Tostan implements an adult and adolescent literacy training module as the final component of its three-year Community Empowerment Program (CEP). Since 2007 UNICEF has funded the CEP in 200 villages in rural Senegal. After the first two years focused on other training related to community development and empowerment, the first part of the Aawde literacy and numeracy module took place from March–June 2009 for a total of 120 hours in the classroom.[4] Each community has class three times a week for 2.5 hours each time or thus a total of 7.5 hours/week. Class size varies ranging from 50-100 depending on size and enthusiasm of

[2] There is competition between two mobile telephone firms, Sonatel Mobiles and Tigo, which has helped lower prices substantially and drive expansion over the past few years.

[3] Recent research (2006) by Forrester using data from the North American Consumer Technology Adoption Study 2006 Benchmark Survey shows that overall young people are more likely to make use of emerging technologies. This includes not only mobile data services but also social networking web sites such as MySpace. And while all age groups in North America were adopting technology broadly, younger generations were adopting first and harnessing the full use of technologies. Thus, empirical evidence suggests that younger cohorts may be best set to harness the tools of text messaging in communication.

[4] To a lesser extent Tostan's course covers Project Management during this time.

the village. Starting in late 2009, Tostan added a 150-hour cell-phone module to the literacy course which ran from October-February 2010. As part of the cell phone module Tostan distributed 15 practice phones in each of the 200 villages.

The *Jokko Initiative* is a pilot study designed to measure the outcomes on literacy and numeracy by adding a free "SMS Community Forum" to Tostan's expanded adult literacy program, which now includes the new cell phone literacy module. UNICEF partnered with Tostan to add Community Forums based on SMS text messaging that allow a community member to disseminate information to a network of peers by sending a single text message. The goals of the SMS Community Forum are to increase use of text messaging and, thus, literacy and numercy skills, and to promote social interaction and empowerment (especially among women and girls).

Tostan selected 15 villages to pilot the SMS Community Forum. We worked with them to select 5 comparison villages in the same region that were also going through the same stage of UNICEF-supported training.

The 20 villages received the curriculum (16 distinct lessons), Mobile Phone for Literacy and Empowerment, October 2009–February 2010, three times a week for 2.5 hours each time, and a total of 150 hours.[5] Although these sessions mainly focused on learning how to use a cell phone, literacy and numeracy skills were also included.

Fifteen of our 20 villages had access to the SMS Community Forum. Participants in these 15 villages received 5 additional educational sessions specifically focused on the SMS Community Forum.

Tostan collaborated with UNICEF New York, Department of Communications' experts and RapidSMS programmers to design the SMS Community Forum, which allows a user to send messages to multiple users within her network through a server. Subscribers from our 15 villages with access to the system have been trained on how to use the SMS Community Forum to promote development initiatives or events in their communities. To operate the system, participants in Tostan's adult literacy and numeracy program can join the network for free during class. They learn how to send a text message, and specifically how to send a text message to the SMS Community Forum.

There were two big Virtual Communities, one for each major local language. The total number of subscribers in the Fulani community using the SMS Community Forum totaled 219 while the Soninke SMS Community Forum totaled 217 (or 436 total in both networks). In addition, participants could register for a geographically local community in their village.

The SMS Community Forum was free during class (December 2009–Feb. 2010) and cost the price of a message after that date.[6]

[5] For the other 180 villages not in the pilot test zone, the cell phone module ran from October-December with 90 hours of class over those three months.

[6] The average cost to send a message internationally with one of the largest cell phone providers in Senegal, Orange, is 100 CFA the equivalent of US$0.20. The exchange rate is based on Official U.S. Treasury 2009 exchange rate of 479.12 per $1 USD.

Data Collection

We collected baseline and follow-up survey data in 15 villages with SMS Community Forum and the 5 comparison villages. The survey was implemented by the evaluation team working with Tostan supervisors in the local languages of Fulani and Soninke.

Following Tostan's reports that 80% of participants in its Community Empowerment Program (CEP) are women and/or girls, we targeted our sample to represent women and girls accordingly. At the time of the baseline survey, 77% of women and girls and 23% of men and boys participated. Based on our gender and age targets, the Tostan literacy and numeracy teachers and supervisors assisted the evaluation team to select on average 40 participants within each of the 20 village classes.

The baseline survey took place in November 2009. This date was at the beginning of the cell phone training and after the first four months of Aawde numeracy and literacy training that had occurred in early 2009 (followed by a break for the rainy season). The baseline survey covered demographics (age, gender, education, income, and employment); cell phone usage; literacy and numeracy; and social networks.

Our literacy test asked people to link two pictures to the appropriate word, to read 2 sentences, and to read a paragraph and answer questions about it. We gave partial credit for the sentence reading and there were four facts to recall from the paragraph. If they read both words, both sentences, and remembered 2 or more of the facts in the paragraph they received a "high" literacy score. Our numeracy test asked people to read three numbers and to do four simple arithmetic problems (see Appendix 1 for the full review of the Core Competency methodology used).

The March 2010 follow-up survey covered cell phone usage, literacy and numeracy, and social networks, as well as users' experience with RapidSMS. The survey was conducted directly after the end of the Tostan class in February 2010.

We also reviewed every message sent on the SMS Community Forum over the period of operation of December 15, 2009–May 15, 2010. To best understand what type of messages participants sent, each of the total 570 messages sent on both Soninke and Fulani speaking SMS Community Forum was translated into French and then categorized by type of message–health, education, environment, economic, etc. (for a full review of the categories see Appendix 2).

Finally, to learn more about who is sending messages, especially after the end of the Tostan classes, in June 2010 we sampled 160 of our 436 members of the SMS Community Forum by phone. We called 100 from the Fulani speaking communities and 60 from the Soninke speaking communities. In an effort to learn about both the average user and those who are the heaviest users, we oversampled heavy Forum users to make up 30% of the total sample.[7] The telephone

[7] The selection criteria is based on all messages sent from Dec. 2009 to May 2010. We selected 50 top users from the Fulani community and 30 top users from the Soninke community. However, due to lack of response we ended up reaching 31 of the top users in the Fulani community and 16 in the Soninke community. This represents 31% of the Fulani community and 27% of the Soninke community who are top SMS Community Forum users. We then selected the 44 members of the Soninke community randomly and 69 from the Fulani community randomly. We selected more Fulani community members as there are 10 Fulani speaking villages and 5 Soninke speaking villages which receive the system.

survey asked about location, age, occupation, number of messages sent, and secondary users in the household.

Results

Baseline

Our November 2009 baseline survey took place three months after the end of the initial March–June 2009 literacy training in the villages. Thus, our baseline survey gives important indicators for the success of four months of non-formal adult and adolescent literacy courses in rural Senegal, three months after the module has finished.

Table 1: Summary Statistics on Age, Gender, Education, Income and Employment

	Total Sample	Female	Male	Adolescent Girls*	Adolescent Boys*
	N = 800	N = 347	N = 119	N=263	N=64
% of total sample	(77% total female)	44%	15%	33%	8%
Age (years by top categories)	31% are 15-20 & 16% are 26-30	29% are 21-25 & 28% are 26-30	23% are 21-25 &25% are 26-30	74% are 15-20	78% are 15-20 years
% of participants who are married	70%	94%	81%	50%	8%
% of participants who report no formal education	71%	82%	73%	55%	43%
% of participants in school presently	7%	2%	4%	10%	25%
% of participants who report having a paying job (% who report working for themselves)	5% (15%)	5% (17%)	8% (10%)	5% (14%)	5% (11%)
Average size of household	26	27	28	25	20
Average no. of household members 18 years of age or less	10	10	11	10	7
Household salary of respondent and their partner	$26	$21	$53	$7	$11
Average kilograms of flour consumed / week	8.42	8.67	8.48	8.35	6.51
Average kilograms of rice consumed / week	5.96	6.24	5.88	5.96	4.65
Key household decision maker	Husband (36%)	Husband (55%)	Father or Mother (33%)	Father or Mother (41%)	Father or Mother (76%)

All data for this table is from the baseline survey, collected November 2009;
*Adolescent Boys and Girls are consistent with the definition of youth used in this paper 15-20 years of age.

609 people lived in villages receiving the RapidSMS system and 196 in the 5 villages without the system. There was no statistically significant difference between the 15 villages who received the SMS Community Forum and the 5 villages which did not when we ran *t*-tests on level of electricity, gender and age balance of participants, weekly reported salary, education levels, access and usage to cell phones. The one difference we found is smaller average family size in the five villages which do not receive the SMS Community Forum of 22 persons vs. 27 in the 15 other villages ($P<0.01$).

Only 22% of women and 40% of men reported being literate. Similar rates of men (41%) but even fewer women (14%) demonstrated high literacy on our literacy test. Similarly, 85% of respondents could do none of the four basic arithmetic problems we posed. These low rates of tested literacy are not surprising given the self-reported education levels: 82% of women and 62% of adolescent girls have no formal education, only modestly worse than the 72% of men and 43% of adolescent boys reporting no formal education.[8]

The family size is very large with an average of 26 persons per household, 10 of whom are 18 years of age and under. The large sizes are because many households are polygamous and most women bear many children. Among those surveyed just 5% report having a paying job, with 15% additionally reporting being self-employed. The main livelihood activities are agriculture and livestock farming.

Baseline Cell Phone Usage

At the baseline survey 58% of our sample reported having used a cell phone before (Table 2). Cell phones were primarily used to call and respond only (91% of total sample) while 8% of the total sample reported using the cell phone to send messages.[9] On average, the population made only 1.37 calls per week. Further, at baseline our population reports sending only 0.20 messages per week and receiving 0.62 messages per week (most of which are from the telephone company.) Further, of the 16% of the total population which report receiving messages, only 9% of them report being able to read the messages they receive. This highlights a phenomenon that villagers told our research team qualitatively. Frequently, in each family there is one person, often times a younger male, who has formal education and who reads all the families text messages. Thus given most families share cell phones (2.12 phones per household) and on average our families consist of 16 persons aged 19 or more (26 persons total), trying to identify who from the family is using the phone to send messages on the SMS Community Forum is a challenge. While this issue of shared cell phones makes ascertaining exactly who writes messages on the Forum difficult, we have reason to believe the cell phone owner is more likely to have the phone with him/her and use it more frequently.

[8] The definition of youth is not clear-cut. The United Nations General Assembly endorsed with Resolution 36/28 1981 the official definition of youth to be 15-24 years of age. However, they then distinguish between cohorts of 15-19 as adolescents and 20-24 as young adults. Contradictorily, African nations have defined youth as longer. Nigeria defines youth as 10-24 years of age, Kenya and Malawi 15-30 years of age, Senegal as 15-35 years of age, and South Africa as 14-35 years of age. See Child Youth and Family Development Human Sciences Research Council, 2005.

[9] The extra 1% not accounted for in this table represents people who reported having no abilities to use a cell phone.

Table 2: Cell Phone Usage (Baseline)										
	Total Sample		Women		Men		Adolescent Girls		Adolescent Boys	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
No. cell phones per family	799	2.12	347	1.99	118	2.67	263	2.2	64	1.51
Yes, I own a cell phone	801	16%	347	13%	119	37%	263	11%	64	20%
Yes I once used a cell phone	801	58%	347	57%	119	71%	263	53%	64	59%
I share my cell phone with others	801	53%	347	53%	119	62%	263	49%	64	52%
With a cell phone I can answer & respond only*	479	91%	204	92%	85	92%	148	89%	39	95%
With a cell phone I can answer, respond, and write & receive messages*	479	8%	204	7%	85	8%	148	10%	39	5%
Avg. no. of calls you made last week	799	1.37	347	1.18	118	3.09	263	0.97	64	1.56
Yes, I receive SMS text messages	801	16%	347	15%	119	29%	263	11%	64	22%
I can write messages on a cell phone	801	8%	347	6%	119	18%	263	6%	64	22%
Avg. no. of messages you send per week	799	0.20	347	0.12	118	0.62	263	0.11	64	0.41
Avg. no of Text messages you receive per week	799	0.62	347	0.24	118	1.78	263	0.40	64	1.75
I can read the messages I receive	801	9%	347	6%	119	19%	263	8%	64	16%
*For respondent's cell phone ability, the missing percentage is for the respondent who responded nothing.										

The Intervention

The SMS Community Forum was functional from December 15, 2009–May 15, 2010. In total 436 participants joined both community forums in the 15 villages.

Follow-up Cell Phone Usage

While only 44% of respondents could correctly identified the symbol on the cell phone which represents network coverage at baseline, that rate was almost universal (96%) at the follow-up.

Table 3: Follow-up Survey and Cell Phone Ability and Usage by Gender and Age										
	Total Sample		Women		Men		Adolescent Girls		Adolescent Boys	
	N	Mean	N	Mean	N	Mean	N	Mean	N	Mean
No. Cell Phones per family	663	3.14	338	3.63	84	3.2	200	3.46	35	1.85
Yes, I own a cell phone	679	29%	349	30%	84	55%	204	20%	36	22%
Yes I once used a cell phone	658	98%	342	97%	81	100%	194	98%	35	94%
I share my cell phone with others	656	94%	335	96%	82	94%	200	92%	35	97%
With a cell phone I can answer and respond only	656	35%	335	40%	82	22%	199	34%	34	26%
With a cell phone I can answer, respond, and write and receive messages	656	65%	335	60%	82	78%	199	66%	34	74%
Avg. No. of Calls you made last week	663	3.19	338	3.07	85	4.85	200	2.66	34	3.47
Yes, I receive sms text messages	656	84%	335	82%	83	95%	198	83%	34	79%
I can write messages on a cell phone	664	62%	339	57%	85	80%	200	64%	34	65%
Avg. No. of Messages you send per week	685	8.83	352	8.31	85	13.51	206	7.61	36	9.72
Avg. No of Text Messages you receive per week	685	2.87	352	2.59	85	4.66	206	2.71	36	2.31
I can read the messages I receive	550	73%	274	66%	79	94%	166	75%	26	88%

At follow-up, 29% of respondents own a cell phone, a very large increase from 16% just four months earlier. Because Tostan had collected the 15 practice phones before our follow-up, it is unlikely this increase represents these lent cell phones.

Cell phone use rose to be nearly universal (98%), from 58% at the baseline. Further, a large difference is seen in the population's reported ability to send and receive text messages. At the follow-up 65% of the total population reported being able to send and receive text messages in addition to make calls with a cell phone, up from 8% at baseline. This steep increase in ability to send and receive messages on the follow-up survey is mirrored by the percentage of the total sample which reports being able to read the messages they receive–73%.

Text messaging rose from sending 0.2 and receiving 0.6 messages/week to sending 8.8 and receiving 2.9 messages/week. The increases were large for both men and women and adolescents and adults (See Table 3).

At the follow-up, 78% of respondents report receiving messages, compared to 17% at baseline. The top three recipients of messages were Community Members (54%); Friends (23%), and Family (11%). The top three topics were: Community Events (38%), Financial Problems (27%), and Medical Problems (12%). (See Appendix 4)

SMS Community Forum

To understand the uses of the SMS Community Forums, we analyzed all messages, interviewed SMS Community Forum posters, and interviewed users more generally.

Analysis of Messages

To understand how the SMS Community Forum was utilized by participants, all the messages were categorized (Table 4 and See Appendix 2). A total of 570 messages were sent over this five month period. The bulk of the messages (79% or a total of 452 messages) were sent from Dec. 15, 2009–Feb. 5, 2010, with only 21% sent from Feb. 6–May 1, 2010. Thus, given classes finished end-February, users seem more likely to write messages to the SMS Community Forum during the class. This could be because users had more access to cell phones and free access to cell phone credit.

Another possible contributing factor is the system experienced a breakdown for a large part of April. It is possible that participants who tried to send messages in April became frustrated that it didn't work and were concerned that the system was shutdown and they would only waste money by sending messages. The utility of the RapidSMS SMS Community Forum is in question given that most users used the system when it was free and subsequently usage greatly plummeted after the formal class setting.

Given the different incentives of the two periods of messages sent, we divide the main types of messages sent between the first period Dec. 15, 2009–Feb. 5, 2010 and Feb. 11–May, 2010. For both periods 1 and 2 the most frequent type of message sent are in relation to social mobilization and meetings–23% for period 1 and 31% for period 2.

People used the SMS Community Forum to announce social mobilization meetings and to prepare some community events, most frequently women's activities. The second most popular messages sent in period 1 relate to the environment (17%) and of which were mainly to inform people about village cleanings. In period 2, the second largest type of messages sent relate to health (27%), up from 12% in period 1. With the approach of the rainy season people use the system to call for mosquito net distribution and give information about preventive measures prior to the rainy season. Educational messages declined relatively between the two periods by 9% due to the classes ending in beginning of March. The bulk of the educational messages were sent by Tostan facilitators who used the system to announce schools activities including the beginning of classes, schedule changes, etc.

Table 4: Messages						
	Total Messages sent Dec. 2009- May 2010		Messages From Dec. 15th, 2009- Feb. 5, 2010		Messages from Feb. 11- May 15, 2010	
Categories	No. messages sent	% of Total	No. messages sent	% of Total	No. messages sent	% of Total
1. Youth Activities	19	3%	16	4%	3	3%
2. Health	88	15%	56	12%	32	27%
3. Education	57	10%	53	12%	4	3%
4. Celebration	20	4%	20	4%	0	0%
5. Religion	41	7%	35	8%	6	5%
6. Economic Activities	17	3%	16	4%	1	1%
7. Environment	91	16%	76	17%	15	13%
8. Social Mobilization and Meetings	142	25%	105	23%	37	31%
9. Personal Messages	95	17%	75	17%	20	17%
Total	570	100%	452	100%	118	100%

Who are SMS Community Forum Users?

There were between 750 and 1,500 Aawde participants in our 15 pilot villages.[10] However, from our baseline survey only about 1 in 8 of our adult respondents owned a cell phone at baseline. In total, about 400 Aawde participants joined the network including Tostan staff (436 members to be precise).

To better understand demographic characteristics about our SMS Community Forum Members in June 2010 we selected the 50 top users from the Fulani community and 30 top users from the Soninke community to be interviewed by phone. However, due to lack of response we ended up reaching 31 of the top users in the Fulani community and 16 in the Soninke community. This represents 31% of the Fulani community and 27% of the Soninke community who are top RapidSMS forum users who were interviewed.

We then selected 44 users from the Soninke community and 69 from the Fulani community randomly to complete our telephone survey of 60 Soinke SMS users and 100 Fulani SMS users in total. We selected more Fulani community members as there are 10 Fulani speaking villages and 5 Soninke-speaking villages which have access to the SMS Community Forum.

The most frequent type of messages sent by the Soninke are: Health (36%), Community Meeting (32%), and Personal Greeting (12%). For the Fulani community the most frequent messages sent

[10] Exact class size varies and is at best estimated between 50-100 participants per village.

by those interviewed includes: Personal greetings (32%), Community Meetings (22%), and Health (22%).

To our surprise, 36% of the SMS Community Forum users we called randomly were not enrolled in Tostan's Aawde adult literacy class. In fact, 55% were not even in one of the villages with classes which received training on the SMS Community Forum (this suggests class participants from another village in the region inscribed in the SMS Community Forum). Apparently these users perceived some benefit to the Forum, as they took the time to learn and use the system. Of the 57 RapidSMS users we found not to be a part of the Aawde class, 86% are male and 75% report they heard about the SMS Community forum from Tostan Supervisors.[11] For those not enrolled in Tostan's literacy and numeracy course, men are more likely to use the Forum than women given they have higher rates of literacy and cell phone ownership at baseline in the study zone.

Interviews

To get an understanding qualitatively of how some participants have used the RapidSMS SMS Community Forum in early July 2010, Tostan volunteers went to visit some of the 15 villages which participated in the pilot program. In one of these villages, Sare Dialo, the team met with two SMS Community Forum users–Khadiatou M'Ballo and Dieynabou Baldé–who are physically disabled. Dieynabou learned how to read, write, and send a text message in Tostan's education program. Now she uses the SMS Community Forum to arrange transportation to community events that she might not otherwise be able to attend.

A second anecdote, related by multiple users, is emblematic of the potential of RapidSMS technology to accelerate the diffusion of and to help reinforce positive social change. The traditional practice of female genital mutilation or cutting (FGM/C) is still an issue in rural Senegal despite the practice being outlawed nationwide in 1999. Believers in FGM/C support the practice believing that by sustaining it improves feminine hygiene and helps to eliminate disease. It is also thought to be a way to preserve family honor as well as a girl's virginity and eligibility for marriage. In many communities, it is a criteria for social acceptance. FGM/C is condemned by medical and human rights organizations. FGM/C has a number of serious side effects including a risk of excessive bleeding, serious infection, exposure to disease (such as HIV), and even death. In the long term, some women experience chronic problems with urination, menstruation, sexual relations, infertility, pregnancy, and childbirth. Today, some 28% of women in Senegal have been cut.[12]

Given this context, the following story was relayed about a man in one of our pilot villages who wanted to have his young daughter cut. He decided this despite his village's collective decision to abandon female genital cutting. Other villagers sent messages on the SMS Community Forum to warn community members of the man's intentions. The news spread rapidly, and in the face of overwhelming social pressure, the man renounced his intention to have his daughter cut.

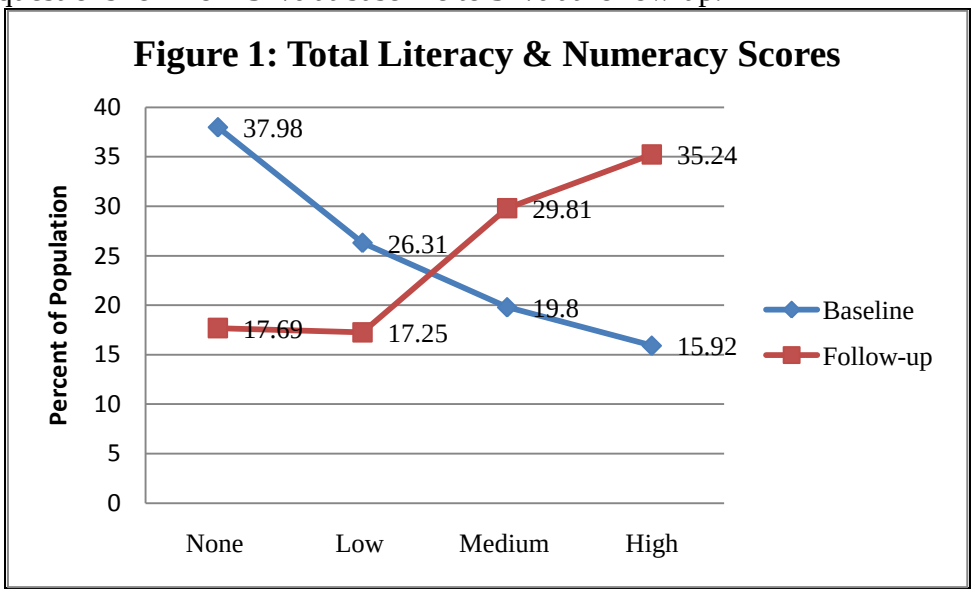
[11] We know that in total there are 50 villages in the Kolda region who went through the Tostan Aawde program at the same time as our 15 villages which received the "SMS Community Forum" All of the Tostan supervisors were trained on teaching the cell phone module in September, 2009 and were also all introduced to the SMS Community Forum. While only 15 villages were selected to pilot the forum, it is possible that Tostan supervisors in other non-RapidSMS villages chose to introduce the SMS Community Forum to its classes.

[12] Source: DHS (2005)

Literacy and Numeracy Outcomes

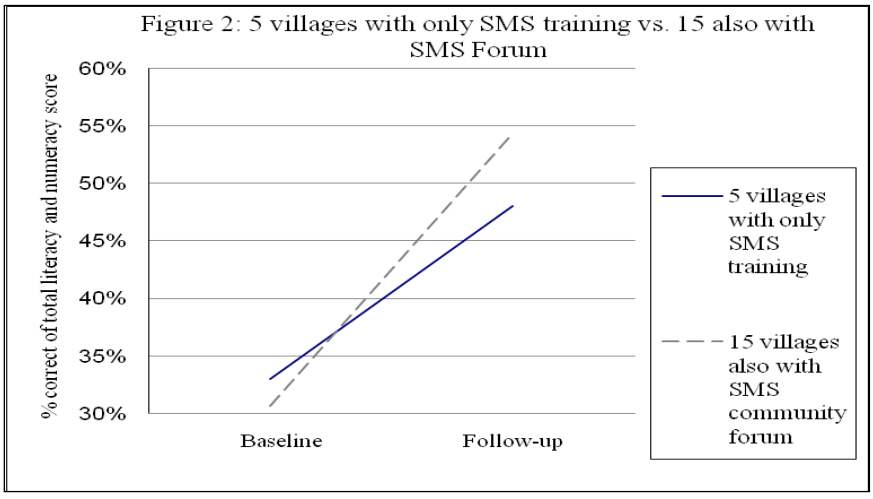
Main Results

The share of respondents getting only zero or one answer correct in the literacy test (out of 17 possible) fell from 38% at baseline to 17% at the follow-up. There was a corresponding increase in the share getting half or more correct. Similarly, the share getting none or one right out of 8 numeracy questions fell from 51% at baseline to 31% at follow-up.



Note: We categorize the total baseline test score as None for 0-2 points out of 32, Low for 3-12, Medium for 13-22, and High for 23-32 points.

Notably, for the 15 villages which received the cell phone module and access to the RapidSMS SMS Community Forum they had a combined literacy and numeracy score of 16.85 (n=585) while the five villages which did not have access to the SMS Community Forum had a combined literacy and numeracy score of 14.85 (n=166). The higher score at the six month follow-up for the 15 villages is statistically significant (P<0.02) indicating the SMS Community Forum had a positive increase on demonstrated literacy and numeracy rates when included in the cell phone literacy module (see Figure 2 below).



Cost Effectiveness

The positive association of the SMS Community Forum and numeracy and literacy outcomes should be evaluated using a costs-benefits analysis in anticipation of expanding the Forum to all Tostan classes.

Although the initial costs of setting up the Forum have already been incurred, the costs of broadcasting to Community Forum members is very high. During the pilot users paid on average 10 CFA francs (~ 2 cents) to send a message to the Community Forum number. Tostan then paid the cost of sending the message to the over 200 users on each system, or the equivalent of about $5 per message. Tostan's total cost was $2,870 for the 570 messages sent during this pilot. If Tostan was to expand this nationwide in Senegal, the costs could easily exceed $2 million per year.[13] Maintenance costs may also be substantial.[14]

If the system were to expand, Tostan might be able to negotiate with the telecoms provider for a better rate for bulk text messages. Alternatively, revenue from advertising might make the system financially sustainable. Otherwise, the high costs of sending bulk messages implies it is not clear whether this is a good investment for Tostan.

Fortunately, other providers such as Google have recently introduced a free SMS system in Senegal. This system is designed for users to create a message on a computer, which is then sent for free to a phone.

Comparison of Different Literacy Assessment Methodologies

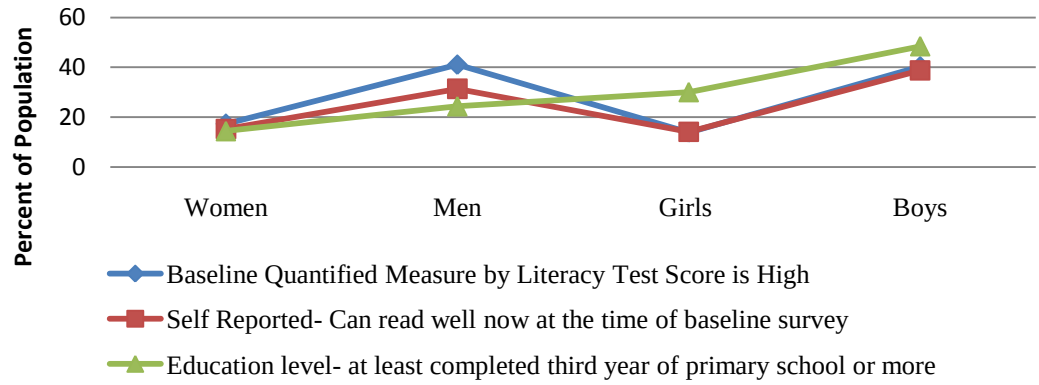
In Senegal there are three main approaches which have traditionally been used to measure literacy. These include: 1. some studies consider that a person who has finished a certain level of schooling is literate (e.g., a person who has attended primary school is "automatically" considered as literate); 2. a person is sometimes considered as literate if this person declares him or herself literate (self-assessment); and 3.a person may be considered as literate after succeeding in a test to determine his or her ability to read and write (Nordveit, 2005). To compare all three methods, our data collection includes last year of education for all participants in Tostan's Aawde (literacy and numeracy) program, their self-reported ability to read in their local language both prior to and after the class began, as well as a methodology for evaluating literacy based on the Core Competencies approach.

Figure 2 overlays the three core measures used to assess literacy. From Figure 2 we learn that participants who are the lowest level in literacy tend to upward-bias their responses when they self report between 28 percentage points for men and 15 percentage points for women, rending self reporting very unreliable for lower literacy achievers. Interestingly, for high level literate portions of the population, self-reporting proves to be fairly accurate, apart from men who under-estimate their literacy skills.

[13] The exchange rate is the 2009 annual exchange rate received from the U.S. treasury archive Senegal CFA/USD average exchange rate. The official average exchange rate for 2009 is 479.12 CFA/$1 USD.

[14] Due to the need to have the system in continual operation, Tostan has identified the professional technical support of Orange to keep the platforms, the modems, and the technical systems needed to keep the cell phone system needed. This is an additional cost that would need to be assessed in advance of expanding the SMS Community Forum network coverage.

Figure 3: Comparison of Evaluation Methodologies of Literacy & Numeracy



Given these comparisons of self reporting for low and high level literacy skills and actual scores from literacy tests, we can conclude self reporting as a measure of literacy provides vast over-estimations of literacy levels particularly for the lowest achievers of the population. Further, assuming that individuals who report reaching grade three in elementary level education are literate does not correspond with actual literacy levels in the population (see Figure 3). We recommend in the future adult literacy programs use quantitative core competency basic literacy tests to quantify and compare actual literacy outcomes from the program.

Table 5: Outcomes for Literacy and Numeracy for Sample

	Scale (total points)	Total Sample	Women (21 plus)	Men (21 plus)	Girls (13-20)	Boys (13-20)
Baseline Survey Quantitative Score						
Combined Literacy & Numeracy Competency	Sample Size (N)	798	347	117	261	62
	None (0-2)	37.98	41.5	21.37	44.06	25.81
	Low (3-12)	26.31	27.67	18.8	31.02	12.91
	Medium (13-22)	19.8	19.32	23.05	17.24	24.2
	High (23-32)	15.92	11.54	36.74	7.67	37.09
Follow-up Survey Quantitative Score						
Combined Literacy & Numeracy Competency	Sample Size (N)	684	351	85	206	36
	None (0-2)	17.69	21.36	3.53	16.99	16.67
	Low (3-12)	17.25	20.78	9.43	15.54	11.12
	Medium (13-22)	29.81	28.75	25.9	34.47	22.24
	High (23-31)	35.24	29.05	61.2	33.02	50.02

At baseline, most women (42%) and girls (44%) score 'No literacy and numeracy skills.' The lowest category for women and girls is the high level of literacy and numeracy which represents

12% of women and 8% of adolescent girls. Conversely, at baseline, both men and boys literacy is represented by a U-shape curve where the highest point of their mass is at the high levels of literacy and numeracy.

At the time of the follow-up survey–directly after the second half of the literacy and numeracy course (1st half= 120 hours + 2nd half=150 hours)–there is a large positive change in literacy and numeracy scores across our sample. We observe that the largest portion of our sample now scores medium–high scores instead of previously on the baseline the largest portion scored none–low scores. All participants–women, men, girls and boys show large gains in numeracy and literacy skills between the two surveys. At the end of the Aawde program, women and girls have reversed the illiteracy trend (see Table 5). At the time of the follow-up survey women and girls show a shift from the bulk of their populations previously scoring none–low literacy skills to the bulk of their populations scoring medium–high literacy skills. This outcome could have significant outcomes on women's, and particularly girl's, ability to generate economic income and have more equitable inter-household bargaining power.

Conclusions

Baseline literacy and numeracy were low after the 4 months (120 hours) of part-time adult education (and a break for the rainy season).

Cell phone usage was also low. Although participants received occasional text messages, they usually had to find others in their household to read them. After the cell phone training almost all participants understood and had used a cell phone.

Usage of text messaging (total sending plus receiving) rose from less than 1 message a week to over 10 messages per week from the baseline to the follow-up survey. This increase provides an important opportunity to practice their new literacy skills, and an important incentive to care about literacy in the first place.

Participants used the SMS Community Forum and there were important anecdotal examples of its success in helping to moblize the community. At the same time, usage was very low once class was over. More experimention is needed in how best to use modern communications text messaging networks to promote community empowerment.

Test scores improved substantially after the additional 5 months (150 hours) of training in text messaging and the SMS Community Forums. In particular, all else being equal the 15 villages which had access and training for the SMS Community Forum had a higher score at the six months follow-up on literacy and numeracy rates (16.85 out of 31) than the 5 villages who underwent the same training but did not have access to the SMS Community Forum (14.85 out of 31 ($P<.02$)). The cost and benefits of introducing the SMS Community Forum are not clear, especially given the low numer of messages sent on the system in the second half of the intervention.

We cannot be sure if the new literacy is retained and we cannot be sure training in literacy might not have acocomplished even more than training in text messaging. Neverthless, the results are quite promising.

We also have a lesson for future evaluations: self-reporting of literacy and stated education levels of the third grade elementary are mediocre proxies for literacy and numeracy test scores. To improve accuracy it is both important and feasible to measure these core competencies with short literacy and numeracy tests.

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Appendix 1: Broad Overview of Methodology for Evaluating Adult Literacy & Numeracy

In Senegal there are three main approaches which have traditionally been used to measure literacy. These include: (1) some studies consider that a person who has finished a certain level of schooling to be literate (e.g., a person who has attended primary school is "automatically" considered as literate); (2) a person is sometimes considered as literate if this person declares him or herself literate (self-assessment); and (3) a person may be considered as literate after succeeding in a test to determine his or her ability to read and write (Nordveit, 2005). To compare all three methods, our data collection includes last year of education for all participants in Tostan's Aawde (adult literacy) program, their self-reported ability to read in their local language both prior to and after the class began, as well as a methodology for evaluating literacy based on the Core Competencies approach. There is a cross comparison of the three methods in our results section.

While the Government of Senegal lacks a standardized literacy measure in Senegal, Tostan's model is naturally aligned with the priorities set forth by UNESCO's Literacy Evaluation and Monitoring Programme (LAMP). The more inclusive definition of literacy and easily adaptable Core Competency Approach is a good fit for measuring the level of literacy of our populations.[1] In general, standards for literacy evaluation at the international level have varied widely over the past two decades. At the outset of the Decade of Literacy in 2003 the UNESCO Institute for Statistics (UIS) started the Literacy Assessment and Monitoring Program (LAMP) in partnership with several countries and organizations.[2] The methodology used in LAMP was inspired by surveys conducted mostly in countries of the Organization for Economic Co-operation and Development (OECD), by the International Adult Literacy Survey (IALS), and by the Adult Literacy and Life Skills Survey (ALL). Until recently, these models were the most significant efforts in cross-national measurement of literacy and numeracy (Bénédicte, 2003).

According to the priorities set out by LAMP, the focus of literacy assessment should remain on the long-term impacts of literacy skills on tasks related to a learner's participation in society, to their access to health services, to their ability to exercise rights related to active citizenship and governance, to gender equality, and to their own livelihoods. Given this more inclusive definition of literacy and the very basic level of education levels of our populations, we choose to follow broadly the core competency approach outlined by LAMP.

The LAMP instruments and methods were developed by and validated in six countries including: El Salvador, Kenya, Mongolia, Morocco, Niger and the Palestinian Autonomous Territories. The core components skills tested which make up reader's profiles are measured by:

1. Alphanumeric perceptual knowledge and familiarity- the ability to recognize the letters of the alphabet and single digit numbers.
2. Word recognition- the ability to recognize common words that appear frequently in print. These common words are expected to be in the listening/speaking lexicon/vocabulary of an individual who is a speaker of the target language.
3. Decoding and sight recognition- the ability to produce plausible pronunciations of novel or pseudo words by applying knowledge of the sight-to-sound correspondences of the writing system, and do this accurately, rapidly and with ease.
4. Sentence processing- the ability to process simple written sentences and apply language skills to comprehend accurately, rapidly and with ease.
5. Passage reading- the ability to process simple written passages and apply language skills to comprehend accurately, rapidly and with ease.

[1] According to the priorities set out by LAMP, the focus of literacy assessment should remain on the long-term impacts of literacy skills on tasks related to a learner's participation in society, to their access to health services, to their ability to exercise rights related to active citizenship and governance, to gender equality, and to their own livelihoods.

[2] They did this in order to develop a new methodology for measuring literacy and numeracy skills among youth and adults to improve the available body of statistical evidence (UIS, 2009). For more information see the UNESCO website for the United Nations Literacy Decade. http://www.unesco.org/en/literacy/un-literacy-decade/

Given this study is a pilot study for adult literacy evaluation, and hence has limitations on scope, we focus on the following three of the five above core competencies including: Core Competency 2: Word Recognition; Core Competency 4: Sentence Processing; and Core Competency 5: Passage reading. In addition, because the Tostan course is also focused on numeracy skills we measure basic mathematical operations including addition, subtraction, multiplication, and division. The core competency designed for this evaluation has been incorporated into the wider Tostan adult literacy and numeracy class evaluation. In this way, the literacy and numeracy core competency evaluation has significantly strengthened Tostan's formal measurement of its' Aawde- literacy and numeracy program.

We measure the literacy rate in our population at two points in time, November and March 2010. It is important to note that the November baseline survey for this pilot is not at the strict beginning of the adult literacy class. The first part of the adult literacy and numeracy class ran from March- June 2009, was held three times a week for 2.5 hours each and totaled 120 hours. Tostan's Aawde or adult literacy and numeracy module was then restarted after the rainy season in November 2009 and ran through February 2010 for our 20 villages in the pilot. The Oct 2009-Feb. 2010 session was mainly focused on learning how to use a cell phone however literacy and numeracy skills were also included. Given, the difficulty cited by former and existing adult literacy programs of retention of literacy skills after the project has ended, our baseline survey falls three months after the first period of literacy training in the villages has finished. And thus, our baseline survey gives important indicators for the success of four months of non-formal adult literacy courses in rural Senegal, three months after the module has finished. This measure is an important indicator as it provides crucial information on both attained skills and those retained after three months with no classes due to the rainy season. The second measure in March 2010 represents a measure directly after the second literacy and cell phone module of an additional five months curriculum, and hence totaling nine months overall for the 20 pilot villages, or a total of 270 hours.

Given Tostan's approach and that of the Government of Senegal to evaluating current adult literacy programs in Senegal, we chose to focus on using the framework of the core competencies or literacy component skills outlined by UNESCO's LAMP. Further, due to the small size of this pilot we chose to focus on three of the five core competencies for literacy including:
1. Word recognition- the ability to recognize common words that appear frequently in print. These common words are expected to be in the listening/speaking lexicon/vocabulary of an individual who is a speaker of the target language.
2. Sentence processing- the ability to accurately and rapidly process simple, written sentences and apply language skills for comprehension.
3. Passage reading- the ability to process simple written passages and apply language skills for comprehension with ease.

We believe LAMP's core competencies provide the best measurement of literacy in the non-formal adult education setting because of their inclusive approach and because the basis of literacy evaluation on core competencies fits well within Tostan's and the national government of Senegal's priorities.

Following from the Adult Literacy and Lifeskills Survey published by Statistics Canada in 2003, we also measure numeracy competency of our program participants. Numeracy is included as a domain in the ALL Survey as one of the critical factors in determining the capability of a population to adapt to and effectively function in an increasingly information-laden society or to perform well at work (European Commission, 1996). They cite that schools are placing more emphasis on the links between the knowledge and skills gained in the mathematics classroom and students' ability to handle real-life situations that require activation of mathematical knowledge and skills. Given the increasing need for adults to continuously adapt to changing citizenship, workplace, and everyday life demands, it is vital that nations have information about their workers' and citizens' numeracy in order to evaluate the human capital available for advancement, to plan effective school-based and lifelong learning opportunities, and to better understand the factors that affect citizens' ability to advance their well-being.

We follow ALL's definition of numeracy which is built upon recent research and work done in several countries on functional demands of different life contexts, on the nature of adults' mathematical and statistical knowledge and skills, and on how such skills are applied or used in different circumstances. In light of the general intention of the ALL survey to provide information about a diverse set of life skills, this framework defines numeracy as follows: "Numeracy is the knowledge and skills required to effectively manage and respond to the mathematical demands of diverse situations." The definition implies that numeracy can be viewed as a functional competency that is somewhat different from the traditional notion of "knowing school mathematics" in that it relates to the capacity to act and bring one's knowledge (mathematical and other) to bear on tasks *in context.*

As in the case with evaluating literacy, due to the small scope of our pilot we are not able to do a full review of numeracy as defined by ALL. However, we include two core competencies with which to evaluate numeracy:
1) Number recognition- the ability to recognize common numbers ranging from two to four digit numbers.
2) Simple calculations- the ability to perform basic numeracy functions including addition, subtraction, division and multiplication.

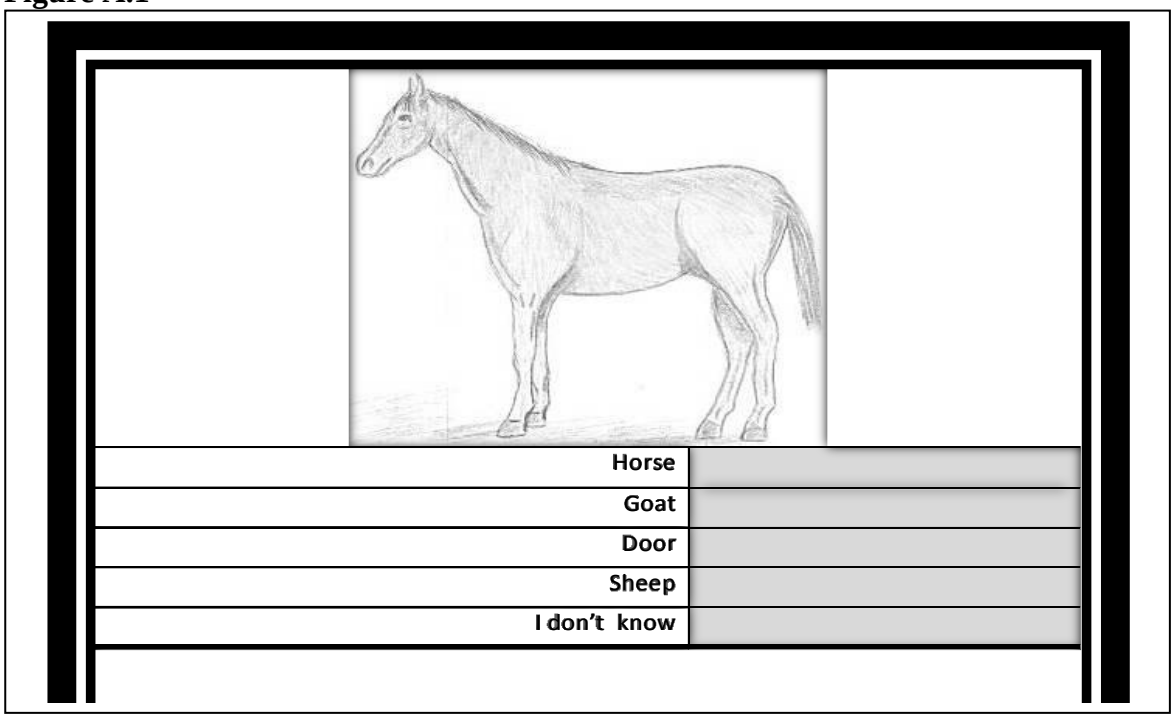
The next section presents a detailed methodology of how we score each of our core competencies at both the baseline and the six-month follow-up survey.

Part B. Detailed Scoring on the Five Core Competencies for Adult Literacy and Numeracy

Adult Literacy

Beginning with the original core competency outlined by UNESCO's LAMP which we adopt- Word Recognition- we ask participants on the baseline and follow-up survey to identify the word which is associated with an object or thing in a picture (See Figure A1 below for an example). This type of exercise is repeated twice for each survey. To score these questions, if the participant answered the question correctly they received one point, or zero otherwise.

Figure A.1



The second core competency our surveys assess is the participant's ability to process sentences. This is the ability to accurately and rapidly process simple, written sentences and apply language skills for comprehension. To do so, we asked the participant to read the following two phrases on our baseline survey:
1) It is hot in the kitchen. It is not an easy task for women who have to prepare the day's meals.
2) There is a party in the village. Everyone wears their best clothes.
On our follow-up survey we repeated the exercise but this time asked participants to read the following two phrases:
3) I have learned to read and write in my native language thanks to Tostan's class.
4) Now, I know how to use my cell phone to call and send written messages.

To evaluate participants' ability to process sentences we use a five point system which corresponds below:

- 0 = She/he could not read the phrase;
- 1 = She/he could read two words or less;
- 2 = She/he could read half the phrase;
- 3 = She/he could read three-fourths of the phrase;
- 4 = She/he could read the phrase perfectly.

Finally for the third core competency of passage reading we asked the participant to read two short paragraphs which recounted a story and asked them to answer questions testing their knowledge of the paragraph they read. Importantly, we gave participants a separate sheet of paper to read and then asked for the paper back before we followed with our reading comprehension questions. For example, on the baseline survey we asked class participants to read the following paragraph.

"The elephants living in Africa are the biggest animals that live on the earth. They grow all their lives. The male elephants can measure about 4 meters in height. They can weigh about 6,300 kilograms. The elephants' ears can measure 1.5 meters. Elephants pass all their days eating. They eat herbs and plants. They also eat fruit, like bananas. With their trunks elephants gather plants and put them in their mouth. They can also drink, with the help of their trunks, about 150 liters of water per day."

We then asked participants to first, "Recount all the details of the elephant's height and weight that you remember from the paragraph above."
The responses are then coded as follows:

- 0 = Did not remember one item or could not read paragraph;
- 1 = Remembered one characteristic of the elephant's height and weight;
- 2 = Remembered two characteristics of the elephant's height and weight;
- 3 = Remembered three characteristics of the elephant's height and weight;
- 4 = Remembered all four of the characteristics mentioned about the elephant's height and weight including- elephants grow all their lives; elephants can measure 4 meters; weigh about 6,300 kg; and their ears can measure 1.5 meters in length.

A second question following the same methodology and has the same points scale. Thus, in summary for each of the three core competencies on the baseline and the follow-up on literacy two questions are asked. The following points are available for each of the core competencies:
1) Word Recognition has a total range of 0-2 points;
2) Process Sentences has a total range of 0-8 points;
3) Passage Reading has a total range of 0-8 points.

The total score for all three sections thus is 0-18. To divide outcomes for participants into three main categories: None, Low, Medium, and High. Points totaling up to 1 out of 18, I label as No Literacy competency. Points totaling between 2-7 are labeled as low; points totaling between 8-13 are labeled as medium; and points totaling between 14-18 are labeled as high. I define between 0-1 points as No

Literacy Competency as this would signify that the household was not able to identify at least both Word Recognition comparisons.

For the six-month follow-up survey we use exactly the same methodology. There is only one small change the Core Competency 3- Passage Reading has a scale of 0-7 instead of 0-8. This changes our total points for all three sections to 0-17. The main categories than have the following breakdown:

- No Literacy [0,1]
- Low [0,7]
- Medium [8,13]
- High [14,17]

Numeracy Methodology

As mentioned we include two core competencies with which to evaluate numeracy. For the first core competency- Number recognition- we ask participants to read three numbers. The numbers increase in complexity, and as before are presented in the local language. For example, on the baseline we asked participants to read the following three numbers- 58, 214, 2500. The responses are then coded:
0= Cannot read any of the three numbers
1= Read one number correctly
2= Read two numbers correctly
3= Read all three numbers correctly

Thus, the core competency of Number Recognition has a total of 0-3 points possible.

The second core competency- Simple calculations- includes four questions asking the participant to perform simple arithmetic (one addition and one subtraction), one simple multiplication problem, and one simple division problem with a calculator. The responses are then coded
0= Cannot perform any of the four math problems
1= Able to perform one math problem correctly
2=Able to perform two math problems correctly
3=Able to perform three math problems correctly
4=Able to perform four math problems correctly
Thus, the core competency of Simple Calculations has a total score of 0-4 points.

Thus, the Numeracy Score for both core competencies ranges from 0-7 and I generate the following classifications:

- None = [0,1]
- Low = [2,3]
- Medium = [4,5]
- High = [6,7]

Putting both the Literacy and the Numeracy Core Competencies together we have a total Score of 25:
Literacy total of 18 possible points
Numeracy total of 7 possible points

In order to ensure a more equal weighting to Numeracy and Literacy, the Numeracy score is doubled thus allowing for a total range of 0-14. In this way, we allow for Numeracy to be more of an equal weighting with Literacy. Thus, our total score for both categories becomes 32. We then divide the categories as follows:

- None = [0, 2]
- Low = [3, 12]
- Medium = [13, 22]
- High = [23, 32]

Appendix 2: Categories of Messages Sent on System

1.Youth Activities	2. Heath and Hygiene	3 .Education	4. Celebration	5. Religion
a. School Activities	**a**. Vaccination	**a.** Back to school activities **b**. Teachers meeting	**a**. Wedding	**a.** Prayers
b. Sport Activities	**b**. Distribution of materials	**c.** Transcripts	**b.** Baptism	
c. Cultural Activities	**i**. Malaria, VIH, Cholera	**d.** School activities	**c.** Religious meetings	
	ii. Premature marriage		**d.** Holidays	
	iii. Excision			
	iv. Child Protection			
	v. Domestic violence			
	vi. Reproductive Health			
	vii. Gender			
	c. Medical Alert			
	i. Malaria			
	ii. Disease			
	iii. Accident			
	iv. Death			
6. Economic Activities	7. Environment	8. Social Mobilization and Meetings	9.Personal Message	
	a. Cleaning activities	a. Inter villages meetings	a. Greetings	
a. Community Management Activities	b. Fire Alert	b. Women meetings	b. Wishes	
b. Exchange of products	c. Landslide	c. Radio or media presence	c. Condolences	
c. Flea markets **d.** Weekly markets	d. Water Pollution e. Desertification	d. Meeting with local authorities	d. Thanks	
		f. NGO Meeting		
Source: The categories were jointly created by the CEGA, Tostan, and UNICEF team.				

Appendix 3: International Migration and Dynamic Effects on Social Networks

The UNDP human development statistics estimate that the bulk of the Senegalese migrant population have relatively low levels of education (57% of Senegalese migrants have less than upper secondary education). Further, most of the Senegalese population who have migrated have migrated to other countries in Africa (56%), while the second largest population reside in Europe (38%) (see Table A3.1). Brain drain is a problem and of the few students that continue to University, 19% of the population emigrate to study and then stay on afterwards.

Interestingly, while only 38% of the Senegalese migrants are estimated to be in Europe, 74% of the remittance inflows come from Europe. This indicates either immigration figures are supremely under-estimated for Europe, or individuals earn much more in Europe than in other countries in Africa. Finally, remittance inflows make up 9% of GDP and are thus a relatively large portion of development finance in Senegal.

Table A3.1: Senegal Migration Rates of Population		
Year	Indicator	
2000-2005	Percentage of international migrants aged 15 years and above in OECD countries with less than upper secondary education	56.6
2000-2005	Percentage of international migrants aged 15 years and above in OECD countries with post secondary non-tertiary education	23.6
2000-2005	Percentage of international migrants aged 15 years and above in OECD countries with tertiary education	19.1
2000-2002	Proportion of international migrant stocks residing in Africa	55.7
2000-2002	Proportion of international migrant stocks residing in Asia	3
2000-2002	Proportion of international migrant stocks residing in Europe	38.1
2000-2002	Proportion of international migrant stocks residing in Latin America	0.2
2000-2002	Proportion of international migrant stock residing in North America	2.9
2000-2002	Proportion of international migrant stock residing in Oceania	(.)
2000-2005	Tertiary emigration rate to OECD countries	18.6
Source: UNDP Human Development Statistics 2009		

Further, despite the official statistics of international migration as 3-5% of the total current population, participants in the Tostan Aawde program report at the time of the baseline survey to have on average 5 family members at present living outside Senegal. Thus given the average household size in this region is 26, 19% of the family lives outside Senegal. This is a large rate of migration by most official estimates. 67% of participants who report having family outside Senegal, report the main method for communicating with them to be calling by telephone, on average 3 times per week. Given the high cost of calling internationally, text messaging could be an excellent addition in the communication with family members outside Senegal. For text messaging to be harnessed literacy skills have to improve alongside cell phone knowledge.

Table A3.2: Communication Patterns with Friends and Family										
	Total		Women		Men		Girls		Boys	
	n	mean	n	mean	n	mean	N	mean	n	mean
Participants have relatives or friends who live in village nearby	774	96%	340	96%	114	98%	249	95%	63	95%
If you communicate by telephone call, how many times per week	350	2	152	2	67	3	106	2	22	4
If you communicate by letter, how many times per week	18	1	7	1	2	3	7	1	2	3
If you communicate by personal visit, how many times per week	460	1	211	1	57	1	152	1	35	2
Do you have relatives or friends outside of Senegal?	746	78%	329	75%	112	86%	235	79%	62	71%
How many members of your family live outside Senegal?	599	5	264	5	97	6	187	5	44	4
If you communicate by telephone calls, how many times per week	414	3	175	2	70	2	135	3	33	3
If you communicate by letter, how many times per week	60	1	25	1	12	1	18	1	6	1
Source : Jokko Baseline Survey November 2010										

On the more local level 96% of our sample reported having relatives or friends who live in nearby villages and about 45% report on average they communicate by telephone most frequently 2 times per week. Only 2% of the population corresponds by letter on average one time per week. Most frequently people communicate by personal visit, 59% of the time, about one time per week. Harnessing mobile SMS technology to communicate with family friends both inside and outside of Senegal could save families time and money.

Appendix 4: Patterns of Communication at Baseline and Follow-up and on our Telephone Survey of SMS Community Forum Users

Table A4.1: Results from Sub-Sample of Users of the SMS Community Forum Telephone Survey[3]

	Total	**Soinke**	**Pulaar**	**Non-Class Member**	**Men**	**Women**	**Youth**
Sample Size	160	60	100	57	101	59	13
Average No. of Messages Sent on RapidSMS "SMS Community Forum"*	4	4	4	3.33	4.33	3.47	4.62
No. 1 Type of Message Sent by Participant on RapidSMS "SMS Community Forum"*	Health (27%)	Health (36%)	Personal Greetings (32%)	Health (41%)	Personal Greetings (30%)	Community Meeting (36%)	Personal Greetings (40%)
No. 2 Type of Message Sent by Participant on RapidSMS "SMS Community Forum"**	Community Meeting (26%)	Community Meeting (32%)	Community Meeting (22%)	Personal Greeting (41%)	Health (28%)	Health (27%)	Community Meeting (40%)
No. 3 Type of Message Sent by Participant on RapidSMS "SMS Community Forum"*	Personal Greeting (24%)	Personal Greeting (12%)	Health (22%)	Community Meeting (18%)	Community Meeting (19%)	Personal Greeting (14%)	Health (20%)
Person who Introduced Participant to the RapidSMS System	Tostan Supervisor (76%)	Tostan Supervisor (70%)	Tostan Supervisor (80%)	Tostan Supervisor (75%)	Tostan Supervisor (79%)	Tostan Supervisor (72%)	Tostan Supervisor (54%)
No. of people in hhld who use the cell phone to make telephone calls	3	3	2.8	3	3.3	2.28	3.15
No. of people in hhld who use the cell phone to send messages to the RapidSMS system	1.6	1.6	1.6	1.43	1.5	1.78	2.62
Sex of Respondent is Male	64%	53%	70%	86%	100%	100%	46%
Age of Respondent	32.6	31.35	33.34	36	35	28.73	17.76
No. 1 Type of Occupation Given	Agriculture/Fishing (24%)	Wage earner (23%)	Agriculture/Fishing (28%)	Wage earners (30%)	Agriculture/Fishing (33%)	Domestic Worker (45%)	Domestic Worker (42%)
Respondent is a Member of Aawde Class	64%	85%	52%	0%	51%	86%	92%
Respondent lives in one of the 15 villages with access to RapidSMS pilot	45%	47%	44%	58%	49%	40%	31%

[3] *Average No. of messages sent over entire recorded time of Rapid SMS "SMS Community Forum from 12/15/2010-05/11/2010 or a total of about five months.

**The type of Message Sent by Participant on RapidSMS "SMS Community Forum" is only available for the 2nd period (02/15/10-05/11/10).

Table A4.2: Most Frequent Type and Location of Calls at Baseline and Follow-up Surveys						
	Baseline			Follow-up Survey		
Most Frequent Type of Calls	Total n=429			Total n=657		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
	Medical Emergency (36%)	Family (23%)	Financial Problems (18%)	Financial Problems (30%	Friends (21%)	Family (20%)
	Women=183			Women=334		
	Medical Emergency (38%)	Family (16%)	Financial Problems (15%)	Financial Problems (30%)	Family (24%)	Friends (18%)
	Men= 80			Men=85		
	Medical Emergency (31%)	Family (20%)	Celebration (18%)	Financial Problems (31%)	Community Event (24%)	Friends (17%)
	Girls= 130			Girls=194		
	Family (34%	Medical Emergency (26%)	Financial Problems (22%)	Financial Problems (29%)	Friends (27%)	Family (18%)
	Boys=34			Boys=34		
	Medical Emergency (29%)	Financial Problems (27%)	Family (24%)	Financial Problems (32%)	Friends (29%)	Community Events (15%)
Most Frequent Location of Calls	Total=429			Total=653		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
	Europe (38%)	Other Zone in Senegal (17%)	U.S. (17%)	Europe (46%)	Another part of Senegal (17%)	Close Village (16%)
	Women=185			Women=333		
	Europe (41%)	Other zone in Senegal (17%)	U.S. (17%)	Europe (48%)	Close Village (16%)	Another part of Senegal (15%)
	Men=78			Men=82		
	Europe (32%)	U.S. (24%)	Other zone in Senegal (21%)	Europe (60%)	Another part of Senegal (12%)	Another African country (12%)
	Girls=128			Girls=198		
	Europe (38%)	Other African Country (17%)	US (14%)	Europe (39%)	Another part of Senegal (23%)	17% Close Village)
	Boys=37			Boys=34		
	Europe (41%)	In other village (19%)	Other zone Senegal (19%)	Europe (38%)	Close Village (27%)	Another Part of Senegal (15%)

Table A4.2: Most Frequent Type of Messages Received and Sent at Baseline and Follow-up Survey						
	Baseline			Follow-up Survey		
Most Frequent Recipient of Message	Total n=65			Total n=402		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
	Friends (43%)	Business (26%)	Family (19%)	Community Members (54%)	Friends (23%)	Family (11%)
	Women=19			Women=184		
	Business (32%)	Friends (26%)	Family (21%)	Community Members (57%)	Friends (17%)	Family (14%)
	Men= 22			Men=67		
	Business (46%)	Friends (36%)	Other (9%)	Community Members (48%)	Friends (18%)	Business (15%)
	Girls= 15			Girls=127		
	Friends (53%)	Family (33%)	Community Members (7%)	Community Members (56%)	Friends (30%)	Family (10%)
	Boys=12			Boys=21		
	Friends (58%)	Business (25%)	Family 17%)	Friends (43%)	Community Members (33%)	Business (19%)
Most Frequent Message Sent	Total=70			Total=403		
	No. 1	No. 2	No. 3	No. 1	No. 2	No. 3
	Medical Emergency (31%)	Financial Problems (23%)	Celebration (17%)	Community Events (38%)	Financial Problems (27%)	Medical Problems (12%)
	Women=20			Women=188		
	Medical Emergency (50%)	Financial Problems (20%)	Celebration (15%)	Community Evens (45%)	Financial Problems (22%)	Medical Problems (14%)
	Men=22			Men=67		
	Medical Emergency (37%)	Celebration (23%)	Financial Problems (14%)	Financial Problems (40%)	Community Events (27%)	Celebration (12%)
	Girls=18			Girls=124		
	Financial Problems (44%)	Medical Emergency (17%)	Celebration (11%)	Community Events (35%)	Financial Problems (26%)	Celebration (18%)
	Boys=13			Boys=21		
	Other (23%)	Business (15%)	Celebrations (15%)	Financial Problems (43%)	Community Events (29%)	Celebration (14%)