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mHealth Compendium

Technical Report

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mHEALTH COMPENDIUM

EDITION ONE

DISCLAIMER
The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development or the United States Government.

The African Strategies for Health (ASH) is a five-year contract funded by the United States Agency for International Development (USAID). ASH works to improve the health status of populations across Africa through identification of and advocacy for best practices, enhancing technical capacity, and engaging African regional institutions to address health issues in a sustainable manner. ASH provides information on trends and developments in the continent to USAID and other development partners to enhance decision making regarding investments in health.

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Last but not least, we would like to thank the Evidence to Action (E2A) project and the AIDSTAR II project. This paper draws extensively on work E2A did in preparation for the Tanzania meeting on Using Mobile Technology to Improve Family Planning and Health in November 2020. The compendium also draws from "*The Use of ICT in Family Planning and Other Health Programs: Trends and Evidence*" produced by AIDSTAR II.

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EXECUTIVE SUMMARY

Mobile health (mHealth) is the provision of health services and information via mobile and wireless technologies. Within Africa the mobile phone has become ubiquitous, making mHealth applications an important tool with which to impact the health of Africans. When applied correctly, mHealth can make real contributions to improved health outcomes. mHealth has the potential to address and overcome: (1) disparities in access to health services; (2) inadequacies of the health infrastructure within countries; (3) shortage of human resources for health; (4) high cost of accessing health; and (5) limitations in the availability of financial resources.

This mHealth compendium contains thirty-five case studies which document a range of mHealth applications being implemented throughout Africa and, in some exceptional cases, in other regions. In order to help USAID missions access relevant mHealth information, this compendium offers project descriptions, publication references, and contact information for making further inquiries. Each two-page case study includes: an introduction to the health area or problem; a description of the mHealth intervention highlighted; a description of any important results or evaluation findings; lessons learned; and conclusion. In addition, the first page includes a summary of the geographic coverage, implementation partners, donor name and contact, as well as contact information for the implementing partner. The case studies in this compendium have been organized within five programmatic areas: Behavior Change Communication, Data Collection, Finance, Logistics, and Service Delivery.

WHAT IS mHEALTH?

eHealth vs mHealth

eHealth is defined by the World Health Organization (WHO) as: the cost-effective and secure use of information and communications technologies in support of health and health related fields, including health care services, health surveillance, health literature, health education, knowledge and research. eHealth is a general term which includes four distinct, but related components.

- Mobile Health (mHealth): Provision of health services and information via mobile and wireless technologies.
- Health Information Systems (HMIS): Systems to gather, aggregate, analyze and synthesize data from multiple sources to report on health; can include information related to patient records, disease surveillance, human resources, management of commodities, financial management, service delivery, and other data needed for reporting and planning purposes.
- Telemedicine: Provision of health care services at a distance; can be used for inter-professional communication, patient communication, and remote consultation.
- Distance Learning (eLearning): Education and training in electronic form for health professionals.

This compendium is focused solely on the mHealth component of eHealth. For the purposes of this paper mHealth includes mobile phones, Personal Digital Assistants (PDAs), tablets, mobile applications, and wireless medical devices.

WHY IS mHEALTH IMPORTANT?

Within Africa, the mobile phone has become ubiquitous. There are about 6 billion mobile phone subscribers in the world, and 433 million of those users are in Africa. Global mobile phone subscription is projected to hit 8 billion in 2016. With the global population currently estimated at 7 billion, The Economist Intelligence Unit predicts that by 2013, the number of mobile phone subscriptions will outnumber human beings. In 1999, cell phone coverage in Africa was about 10 percent. That coverage was shared by South Africa and five countries in North Africa. In 2005, there was a shift in the mobile phone subscription trend as demand in the developing world began to exceed that of the developed world. The number of subscribers in the region grew from 5.4 million in 2003 to 375 million in 2008. Statistics from August 2012 indicated that the number of mobile phone subscribers in Nigeria alone had reached 105.2 million.[1]

When applied correctly, mHealth can make real contributions to improved health outcomes. mHealth has the potential to address and overcome: (1) disparities in access to health services; (2) inadequacies of the health infrastructure within countries; (3) shortage of human resources for health; (4) high cost of accessing health; and (5) limitations in the availability of financial resources. It can accelerate the decentralization of quality health services to lower health service provision levels,

[1] Evidence to Action Project (2012). Use of Mobile Technology to Improve Family Planning and Reproductive Health Programming: A Synthesis of Evidence.

especially in rural areas. mHealth can also be used to deliver important information and behavior change messages on particular health topics to communities, and can serve as an additional channel of health communication, especially for sub-populations which do not normally have regular access to mainstream media (e.g., poor rural women).

KEY FACTORS FOR mHEALTH SUCCESS

The potential for mHealth interventions to capitalize on mobile technology to improve the quality of programs, extend the reach of services, and strengthen health information management systems is great. However, the roll out of mHealth interventions takes time and significant investment in human, technical and physical infrastructure. Continuous capacity strengthening at multiple levels in the use of mobile technology devices, information dissemination, data collection, and monitoring and evaluation must be factored into project design. Through compilation of this compendium, a range of factors that are critical to successful mHealth interventions were identified.

Country Ownership and Leadership:
National ownership and full government participation is critical to long term project sustainability. Active engagement ensures the integration of mHealth into existing national and local health sector plans, strategies, and systems. National governments also play a central role in the creation and maintenance of an enabling environment for mHealth to thrive through the development and implementation of mHealth friendly policies.

Partnerships:
Strong public-private partnerships are key to the success of mHealth initiatives. Across the projects and products profiled in this compendium, prominent partnerships include those with governments, technology software development companies, management consulting firms, international and local non-governmental organizations, phone service providers, health service providers, and their clients. Partnerships with different actors may vary at each stage of the process in order to leverage and capitalize on the necessary expertise.

Coordination:
The efforts of all partners need to be properly coordinated, ideally through the leadership of the government. One approach is to establish a technical working group consisting of partner representatives. Collaboration at the service provider level is critical, as well, to ensure that systems are interoperable[2].

HOW TO USE THE mHEALTH COMPENDIUM

This mHealth compendium contains thirty-six case studies which document a range of mHealth applications being implemented throughout Africa and, in some exceptional cases, in other regions. While there are a number of existing databases with information on the many pilots being undertaken worldwide, these are often cumbersome and sometimes difficult to navigate. The authors envision that a compendium like this one is particularly needed with regard to mHealth where there is a plethora of activities being funded at the country level. In order to help USAID missions access relevant mHealth information, this compendium describes some of the major mHealth applications being utilized in Africa. It should be noted that the first edition of the mHealth compendium is relatively limited in scope. However, it will be annually updated and will grow in number of case studies.

[2] Ibid

Each two-page case study includes: an introduction to the health area or problem; a description of the mHealth intervention highlighted; a description of any important results or evaluation findings; lessons learned; and conclusion. In addition, the first page includes a summary of the geographic coverage, implementation partners, donor name and contact, as well as contact information for the implementing partner. While this two-page document does not offer an exhaustive description of all aspects of each application, it does offer enough information for those interested in learning further about innovative mHealth applications in the region.

The case studies in this compendium fall under five programmatic areas: Behavior Change Communication, Data Collection, Finance, Logistics, and Service Delivery. While it is acknowledged that some of these interventions can be classified into more than one area, the authors of the compendium have tried to highlight the range and versatility of mHealth as a tool in improving health and well-being. Each of these five programmatic areas is briefly described below.

Behavior Change Communication (BCC)

mHealth interventions are frequently utilized for community mobilization, awareness raising, education, and demand creation. It has been reported that mHealth BCC interventions are the most predominant of all mHealth interventions and also the most successful. This is because current interventions center on the use of low-cost SMS texts to reach various audiences. Important short term behavior changes have been observed, though modest.[3]

Most of the currently implemented mHealth applications are stand-alone interventions that use a single channel such as the SMS text to send out information to clients or potential clients or a hotline into which clients can call with questions. These interventions can reach both the general population or specific populations including adolescents, those most at risk, or people living in hard to reach areas. Only a few BCC mHealth interventions have been linked with other channels of communication such as radio or TV programs. However, this is changing with the increase in use of mobile phones. Other relatively new BCC mHealth applications include those which help the user monitor their own health, such as those which track menstruation cycles to help with family planning.

Data Collection

Data collection and surveillance can be enhanced by utilizing mobile communication and personal data devices. Instead of sending paper forms, data can be sent more quickly and reliably through electronic methods. This has been shown to increase reliability, make data more readily available (especially data from remote areas), and enhance the quality of the data submitted. Throughout Africa, mHealth applications have been used for a variety of data collection activities, from routine reporting to large national surveys.

Finance

Mobile money applications are increasingly used in Africa to facilitate payment for health services and other expenses associated with seeking care for both private patients and clients enrolled in various community health programs. These mobile money applications allow registered users to load money into their accounts, make transfers to other users (both registered or not), and withdraw money. While registration for these services is almost always free, transactions have a predetermined fee which is often covered by the specific health program or implementing partner supporting the intervention. Examples of how mHealth applications have been utilized include provision of vouchers for family planning clients to access counseling and services, as well as antenatal services, delivery, and postnatal services at participating hospitals.

[3] Ibid

Logistics

Availability of high quality logistics data has been one of the greatest challenges facing the health care system. Without this data, decision makers cannot adequately manage the supply chain, risking the possibility that patients won't receive the medicines they need. Increasingly, mHealth applications are being utilized to address this issue. Most of these applications allow a lower-level health facility to transmit information regarding their supply of essential medicines to the higher-level facility or warehouse which then provides the commodities. In some cases, these applications have even been utilized by community health workers to ensure they have the basic supplies needed.

Service Delivery

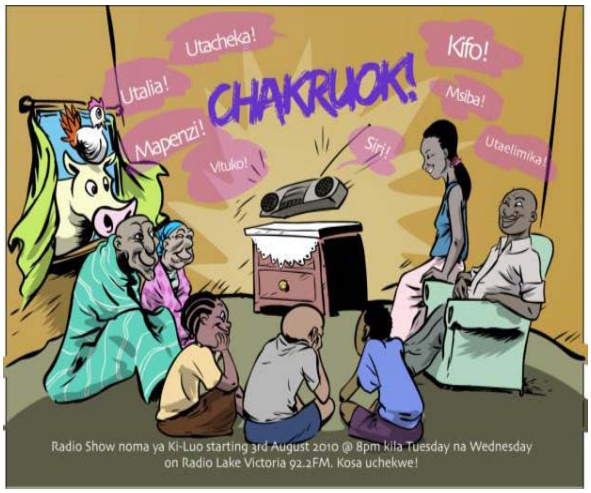
Mobile phones have been used to improve the quality of and access to health care service delivery in a myriad of ways. Applications have been developed that assist health care workers in diagnosing and treating patients, such as the use of phone-based treatment algorithms and SMS reminders to follow up on clients' laboratory results and other services. mHealth has been successfully used to train and retrain health workers. Phone-based applications have also been developed to promote adherence to medications, provide notification of results, and remind patients to keep appointments.

COMPENDIUM CASE STUDIES

Chakruok Interactive Radio Program

Brief Overview

Married adolescent girls have relatively poorer health and use fewer health services than their unmarried peers in developing countries. Improving their access to critical services, including those related to reproductive health and HIV, is still a challenge. Studies from around the world indicate that married girls are often isolated and have limited access to information in general. There is often a generational gap between married girls and their partners, making contraceptive use negotiation and the uptake of other reproductive health services difficult. Yet, married girls often have sex more frequently than their unmarried peers, given the constant availability of their marriage partners.



In order to address these issues, Population Council, through the USAID-funded APHIA II Operations Research (OR) Project, in collaboration with Well Told Story and the Kenyan Ministry of Public Health and Sanitation, designed and implemented a community health project that included a radio program with an interactive mHealth component. The goal was to expand access to reproductive health and family planning (RH/FP), as well as HIV information and services for married adolescent girls in order to improve their reproductive health outcomes.

The project was implemented in Homa Bay and Rachuonyo Districts of Nyanza Province, Kenya, between 2009 and 2011.

- **Geographic Coverage:**
  Nyanza Province, Kenya
- **Implementation Partners:**
  Population Council through the APHIA II Operations Research Project, in partnership with Well Told Story and the Kenyan Ministry of Public Health and Sanitation
- **Funder:**
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Chakruok Interactive Radio Program

About *Chakruok*

Well Told Story, in collaboration with the APHIA II OR project, developed a radio soap opera series revolving around the life of a married adolescent girl, consisting of 20-minute episodes. The soap opera aired twice a week in the evenings, along with a weekly discussion segment exploring key educative topics. Entitled *Chakruok* (meaning 'Beginnings' in Dholuo), the soap opera was aired on three FM stations in Nyanza province over an eight-month period.

Text messaging and call-ins were incorporated into the radio drama to encourage listener participation and communication about the RH/FP and HIV issues raised in the episode concerned. During the weekly discussion segment of the radio show, some listeners who sent in text messages or letters were telephoned for interviews, and a pre-recorded interview with an expert in that week's topic was played. A Facebook page was also set up for listeners to explore the issues raised in the show in more detail. Several times a week, different questions were posted on the Facebook page to encourage discussion and debate.

Leaflets referencing the radio soap opera were developed (in Dholuo language) to accompany the key topics explored within *Chakruok* and to link readers to the radio program. Each leaflet tackled a separate topic. Leaflets were distributed to married adolescent girls by community health workers (CHW) during periodic home-visits, and were also mailed free, twice monthly, to *Chakurok* listeners who requested copies, sending in their names and addresses via text message.

Evaluation and Results

In the course of the radio programming, 3,407 questions and comments were texted to the *Charuok* radio program, and the *Chakruok* Facebook page had garnered 406 Facebook fans. By the end of project survey, study results revealed that 66 percent of married adolescent girls interviewed had either listened to *Chakruok*, or been visited by a CHW in the past one year. There was an increase in demand and utilization of family planning methods among married adolescents. Additionally, support from partners of the married adolescent girls increased.

Based on evaluation surveys, researchers noted that there was a significant change in the following indicators by the end of the project:

- Increased uptake of family planning methods (including long-acting methods) among married adolescent girls;
- Increased support among partners for married adolescent girls' access to reproductive health services;
- Increased attendance at the four recommended antenatal care visits among married adolescent girls exposed to the intervention;
- Decreased use of unskilled birth attendants during the last pregnancy among married adolescent girls;
- Increased use of postnatal care services within 48 hours of delivery among married adolescent girls; and
- Decreased likelihood of worrying about being HIV-positive among married adolescent girls and partners, and increased uptake of HIV-testing among never pregnant married adolescent girls.

Lessons Learned

Radio campaigns built in synergy with multiple media channels can successfully be used to target hard-to-reach groups, such as married adolescent girls. When SMS information is reinforced through other channels of communication such as radio and IEC materials, they are more effective.

Conclusion

The combined use of this mHealth application with community health worker visitation, health information provision, and referrals, is an effective means of reinforcing RH/FP and HIV messages, and of increasing access to RH/FP and HIV information and services among married girls in rural settings.

Information was excerpted from:
Chi-Chi Undie, Harriet Birungi, Francis Obare, Ben Ochieng, Wilson Liambila, Erick Oweya, Ian Askew, Rob Burnet, Bridget Deacon, Aisha Mohamed. 2012. Expanding access to comprehensive Reproductive Health and HIV information and services for married adolescent girls in Nyanza Province. APHIA II OR Project in Kenya. Population Council: Nairobi, Kenya.

CycleTel™

Brief Overview

CycleTel™ is a mHealth application that offers a family planning method directly on a user's mobile phone via SMS. Based on the Standard Days Method® (SDM), CycleTel is a fertility awareness-based method that helps a woman know which days during her menstrual cycle she is most likely to become pregnant. SDM has been proven to be more than 95 percent effective in preventing pregnancy when used correctly.

CycleTel helps a woman determine if she is eligible to use SDM by asking a series of screening questions via SMS. If eligible, she then receives personalized messages about her fertility status, in addition to messages that support correct use of SDM and the service. CycleTel depends on sustained interaction between the user and technology for as long as the woman chooses to use the service.

Georgetown University's Institute for Reproductive Health (IRH), in partnership with others, has followed a step-wise, systematic approach to CycleTel development. IRH conducted a rigorous proof of concept testing from 2009 to 2011 and pilot testing from July 2011 to January 2012, to develop and evaluate the service. IRH is currently exploring partnerships to launch CycleTel in India and other countries worldwide.

- **Geographic Coverage:**
  Lucknow and New Delhi, India

- **Implementation Partners:**
  Georgetown University's Institute for Reproductive Health led a team of partners that included: ThoughtWorks Inc.| Unicel | Indian Society of Healthcare Professionals | FrontlineSMS. Partnerships for service launch are in development.

- **Funder:**
  USAID

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About CycleTel

A woman opts in and joins the CycleTel service by sending an SMS to a designated number. Then, via SMS, she is screened for method use. If she meets two conditions (her periods usually come once a month, and she and her partner can avoid unprotected sex several days each month) she sends the date of her last period to the service and begins using CycleTel. The service alerts her of her fertile days during each cycle. Additional messages support correct use of the method, help her monitor her cycle length, and offer information on other reproductive health issues, such as the importance of optimal birth spacing. Additionally, a helpline number is available for one-on-one consultation over the phone.

FrontlineSMS was used to mimic the service during proof of concept testing. Since an IRH staff member had to send and track all messages via FrontlineSMS, this technology platform was only appropriate to support a small number of CycleTel users. With successful proof-of-concept results, IRH worked with ThoughtWorks to develop a customized software to automate the service.

Once the CycleTel technology platform was built, IRH recruited 715 women in the Delhi region to test the automated version of CycleTel for two menstrual cycles. The purpose of the pilot test was to:

- Ensure that the automated technology functioned properly with a higher volume of users;
- Evaluate user experiences with the service and integrate user feedback before scaling the technology; and
- Test the feasibility of integrating the CycleTel helpline into a fully-functioning family planning call center.

Evaluation and Results

Over 95 percent of users interviewed at exit reported that they received messages at an appropriate time and in an appropriate quantity, indicating that the technology worked as designed. When asked what they liked most about CycleTel, more than 80 percent of users reported appreciating its ease-of-use and the timely reminders. Nearly 90 percent of women and 80 percent of men interviewed said that they would recommend this service to others.

IRH is testing the feasibility of offering the service on an interactive voice recording (IVR) variant of the service. If test results are positive (i.e., if women are able to use the IVR version, which requires them to listen to messages and enter numeric responses), this could make CycleTel appropriate and accessible for millions of women and couples at the base of the pyramid who have an unmet need for family planning but for whom texting can be challenging.

Lessons Learned

- Proof of concept testing, with low-cost technology solutions, is a critical first step to testing a mHealth concept.
- Proof of concept testing informed the development of a "technology functionality" scope that was integral for helping to identify an appropriate technology partner.
- Business plan analysis serves as a reality check as to what level of investment is needed to reach a defined level of scale.
- An ecosystem of partnerships is required to operate and sustain a mHealth service.
- IRH's systematic and rigorous approach to CycleTel development is a model in the mHealth field that other organizations can apply to plan for the scale and sustainability of other mobile services.

Conclusion

Strong interest in CycleTel has been expressed by mobile network operators, telecom aggregators, donors, technical assistance organizations, and others. Discussions are underway with potential go-to-market partners. IRH aims to launch CycleTel in India and expand the service to other countries. CycleTel is now well-positioned to expand access to family planning by offering an effective family planning method directly via mobile phones. As with any innovation, to be taken to sustainable scale, continuous investment is required for research and development, as is the development of sustained partnerships and a strong client base.

Information was excerpted from:
http://mobileactive.org/case-studies/family-planning
http://www.frontlinesms.com/wp-content/uploads/2011/10/FrontlineSMS_IRH_CycleTel_2011.pdf
http://www.slideshare.net/IRHgeorgetown/family-planning-via-mobile-phones-proofofconcept-testing-in-india-cycletel

iCycleBeads™ Smartphone Apps

Brief Overview

iCycleBeads smartphone applications enable women to use the Standard Days Method® (SDM) of family planning through their iPhone or Android devices. The SDM is a fertility awareness-based family planning method that was developed by Georgetown University's Institute for Reproductive Health (IRH). The method identifies which days during a woman's menstrual cycle she is most likely to become pregnant if she has cycles within a certain range. The SDM has been proven more than 95 percent effective. iCycleBeads iPhone and Android apps were developed by Cycle Technologies under license.

Cycle Technologies launched the iCycleBeads iPhone app in December 2010 and the iCycleBeads Android app in July 2011. Currently, the smartphone apps are available to anyone with an iPhone or Android device. They are available in iTunes and the Android Marketplace for one time purchase at $2.99. They are available in English and Spanish. Other languages can be made available.

Cycle Technologies is exploring opportunities to make iCycleBeads smartphone apps more readily available to users worldwide, and in particular, throughout the developing world.

- **Geographic Coverage:**
  Worldwide
- **Implementation Partners:**
  Cycle Technologies developed and manages the applications. The Institute for Reproductive Health at Georgetown University provided consulting support.
- **Funder:**
  Cycle Technologies
- **For More Information Contact:**
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iCycleBeads™ Smartphone Apps

About iCycleBeads™

iCycleBeads Smartphone apps are available to anyone with an iPhone, iPod Touch, iPad, or Android device. The iCycleBeads Smartphone Apps use a CycleBeads visual, as well as a calendar, to help a woman track her cycles and know which day pregnancy is likely.

To use the iCycleBeads smartphone apps, a user enters the date that her period starts. The app will calculate which days during her upcoming cycle she is potentially fertile or not based on her cycle start date and the methodology of the SDM. Color-coded visuals help a user readily identify her fertile days, non-fertile days, and when her next cycle is likely to start. A user will also receive pop-up alerts on her phone for key days such as when her fertile days are about to start, when they are ending, when she can expect her next period to begin, and to remind her to enter her next period start date. The apps immediately notify a user if she has a cycle that is outside the 26-32 day recommended range for effective use of the SDM.

Evaluation and Results

Since the launch in 2010, the apps have been downloaded by approximately 8,000 users (as of October 2012). A majority of users are in the U.S., U.K., Canada, Australia, and other English speaking countries. However, users from all regions and more than 75 countries have downloaded the apps.

iCycleBeads smartphone apps have yet to be introduced in low-resource settings, although a handful of users in developing countries are already using the apps. Given the rapidly expanding use of smartphones in many countries, there is significant potential for impact.

Lessons Learned

- Interviews with women who have used iCycleBeads smartphone apps indicate that users like these family planning apps because they are easy to use and convenient.
- Women also liked the visual quality of the app, which they found easy to understand. As with women who use the SDM through any tool or device, they also like it because the method has no side effects.
- Feedback from users has inspired development of additional features in the app such as the ability to take notes for each day of a user's cycle, and to email cycle data so it can be readily shared with a health provider or partner.
- iCycleBeads smartphone apps are highly sustainable in that the product exists and is already available via widely used marketplaces (i.e., iTunes and the Android Marketplace). Investments needed would be specific to localized marketing and potentially translation.
- At this point, iPhone and Android phones have the most highly evolved application marketplaces. Apps for other types of phones could be considered on a case by case basis in the future.

Conclusion

iCycleBeads smartphone apps can have a significant impact in areas where smartphones, and in particular iPhones and Android devices, are being used. These apps are attractive to women and programs because they enable a woman to use a family planning method that has no side effects, is easy to use, and requires only a one-time, low-cost purchase by the end-user. There are issues related to specific country contexts that may need to be examined more closely in determining the potential impact in a given area.

Information was excerpted from:
http://www.cyclebeads.com/

La Ligne Verte Family Planning Hotline

Brief Overview

Accurate information on fertility trends and family planning in Democratic Republic of the Congo (DRC) has been difficult to obtain over the past decade. In 2005, the modern contraceptive prevalence rate (CPR) was estimated at three to four percent of women of reproductive age in union, less than half the rate of a decade earlier. Numerous factors contribute to the low CPR and high unmet need. A decade of violence and unrest shattered the health and family planning system throughout the country. Additional factors are the dismal and worsening state of the DRC's transportation network, poor communication infrastructure, and the population's low exposure to media such as radio and television. These factors make it extremely difficult to spread health messages. Knowledge of two or more methods of family planning is strongly correlated with the uptake of a method; but in DRC, the level of knowledge, especially of modern contraceptives, is extremely low.

Population Services International (PSI), through its local affiliate Association de Santé Familiale (ASF) implemented the Family Planning Project (FPP) to increase knowledge and the use of modern contraceptive methods among women of reproductive age and their partners. Under the FPP, PSI/ASF used an array of communication channels to spread accurate information on family planning and contraceptive methods as part of their intervention the DRC. One of these channels was the cell phone hotline, locally known as "La Ligne Verte", the first of its kind in the nation. The FPP offers the hotline as one element of an integrated package of services.

The FPP was implemented in Kinshasa and in mostly urban areas of Equateur, Bas Congo, Nord Kivu, Sud Kivu, Katanga, Province Orientale, and Kasai Occidental provinces in the DRC, from 2003 to 2008. FPP launched la Ligne Verte in early 2005 in these project regions.

- **Geographic Coverage:**
  Democratic Republic of the Congo
- **Implementation Partners:**
  Population Services International
- **Funder:**
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La Ligne Verte Family Planning Hotline

About La Ligne Verte

By dialing a toll-free number, callers speak to a trained educator and get accurate information about birth spacing, the correct use of family planning methods, how to avoid unwanted pregnancies, and locating the nearest ASF partner clinic. The Ligne Verte hotline allowed cell phone callers to speak confidentially to trained mobile educators in Kinshasa, to ask about methods and side effects, as well as to get referrals to clinics or sales points in the callers' own neighborhoods.

The Ligne Verte was advertised via mobile educators and posters at clinics and pharmacies throughout the country. The hotline number and hours were printed on items like pocket calendars that were given away during FPP's outreach activities in eight of the DRC's 11 provinces. The number was also broadcast in radio and television spots.

The system operates via a contract with Vodacom, the largest cell phone service in DRC. All calls from Vodacom phones to the hotline are free to the caller; at the end of each month, the FPP pays Vodacom the equivalent of 36¢ per call received.

The hotline is open to calls from Monday through Friday, 8:00 a.m. to 4:30 p.m. The FPP's trained educators staff the line. The project has a pool of 27 such educators in Kinshasa; all received comprehensive training in family planning and outreach communication, and they carry out family planning education in public places such as markets and neighborhoods and in private homes.

Evaluation and Results

Throughout 2007, callers made between 600 and over 2,000 calls a month to la Ligne Verte. Surprisingly, it was men who made the overwhelming majority of calls. In 2007, 84 percent of hotline callers who sought family planning information were men. Most callers, both men and women, wanted more information about contraceptive methods and about purchasing contraceptives.

Katanga province accounts for the greatest number of calls to the hotline, most likely because the FPP operates in five cities and towns there, more than any other province in DRC. Katanga is also home to more than 20 partner clinics and more than 50 partner pharmacies. All of these carry out information, education, and communication (IEC) activities, and promote the hotline.

In Kinshasa, the capital, the high percentage of hotline calls may be linked to the large number of mobile educators (27 in the city alone) who directly promote the hotline. Kinshasa is also home to 20 partner clinics and 106 partner pharmacies and wholesalers, which also promote la Ligne Verte through posters and calendars.

While the majority of calls originate from provinces where the FPP operates, more than 750 calls came from Maniema, Bandundu, and Kasai Oriental, where PSI is not directly implementing the project.

Lessons Learned

Men in the DRC have a higher unmet need for family planning information than anticipated. Men made the overwhelming majority of calls, demonstrating their interest and curiosity in family planning.

The FPP's contract with the cell company included the stipulation that phone calls lasted no more than two minutes each. While most questions and concerns can be addressed in that time, some callers could benefit from a longer conversation. The FPP believes that allowing three minutes per call would address the problem.

Call data could be mined to further evaluate and guide programming. The hotline's call data could also be more closely analyzed as a means of monitoring family planning needs and questions and to help guide future program direction and messaging.

Conclusion

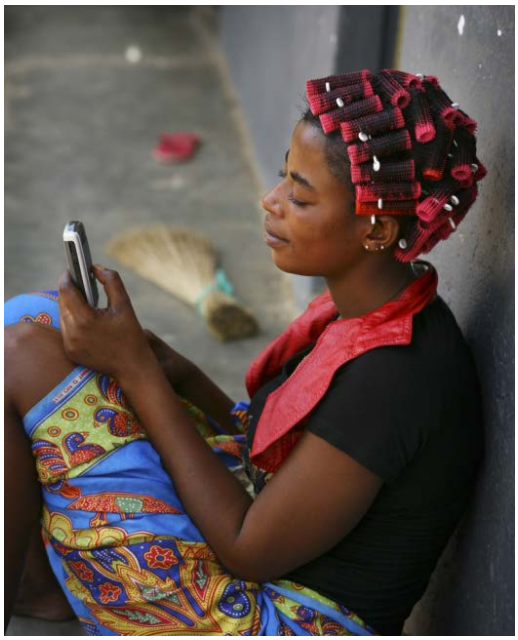
People throughout the DRC are gaining high-quality information about family planning, thanks to la Ligne Verte, a toll-free hotline made possible by cell phone technology. The hotline allows the FPP to reach unprecedented numbers of people in this vast, infrastructure deficient nation.

Information was excerpted from:
Population Services International, 2007. "Cell Phone Hotline Spreads Family Planning Information in DR Congo". Retrieved from http://www.flexfund.org/resources/technical_updates/psi_drc_case_study.pdf.
http://sphhs.gwu.edu/departments/pch/phcm/casesjournal/volume4/peer-reviewed/cases_4_03.pdf

Mobile 4 Reproductive Health (m4RH)

Brief Overview

Family planning is an area where mobile phones provide enormous potential to increase and broaden the reach of health messaging. In Tanzania, only 27 percent of women of reproductive age use family planning and the fertility rate remains high at 5.4 births per woman, demonstrating that numerous obstacles prevent women and men from seeking and using contraception. Disseminating family planning information via mobile phones has promise because characteristics of mobile phones such as privacy, portability and ubiquity may overcome some of these barriers.



Mobile 4 Reproductive Health (m4RH) is an opt-in SMS-based health communication program through which users can access information about nine family planning (FP) methods. m4RH was developed in 2009 by FHI 360 and its partners, and is funded by USAID through the PROGRESS (Program Research for Strengthening Services) project.

m4RH was piloted in Kenya and Tanzania from 2010-2011 as part of a research study aimed at determining the feasibility of providing FP information via text message, the reach of this communication channel, and suggested impact on FP use. It remains operational in Kenya and Tanzania now.

Geographic Coverage:

Kenya and Tanzania

Implementation Partners:

Kenya: The m4RH project in Kenya is led by FHI360 in partnership wth Text to Change, Family Health Options Kenya (FHOK), Marie Stopes Kenya (MSK), Population Services International (PSI), and The Ministry of Public Health and Sanitation of Kenya

Tanzania: The m4RH project in Tanzania is led by FHI360 in partnership wth Marie Stopes, PSI, Pathfinder, FHI 360 ROADS Project, Die Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), FHI 360 Ishi project, Comprehensive Community Based Rehabilitation in Tanzania (CCBRT), and the Ministry of Health and Social Welfare of Tanzania

Funder:

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Mobile 4 Reproductive Health (m4RH)

About m4RH

The m4RH service provides automated information to opt-in users on nine different long-acting, short-acting and coitally dependent family planning methods. The messages address side effects, method effectiveness, duration of use, and ability to return to fertility.

The m4RH messages were developed using evidence-based content, including the WHO family planning handbook for providers, and crafted specifically for SMS use, staying within the 160 character limit. Each message was designed and tested to ensure user comprehension.

Users access the m4RH program by "opting in" or sending a text message containing the keyword "m4RH" to a short code. The structure is menu-driven and allows the option to choose which type of family planning method information the user desires.

The service also provides a database of local clinics, searchable by province (Kenya) or ward (Tanzania). m4RH users are able to search for a local clinic by simply texting the first three letters of their province or district to the m4RH system. After the user responds with the province or district code, the user receives an SMS listing of all clinics in the queried location.

The platform uses a "ping-pong" system through which the user sends a code, receives a response, sends another code, and receives another response, meaning that users only receive messages as they request them. The architecture can also be used to develop, test, and address other FP issues (reminders, refills).

Evaluation and Results

Within the first four months of implementation, the m4RH service received over 2,000 hits. Contraceptive methods that users inquired about were logged by the mobile phone system. Text questions assessing gender, age, promotion point, and potential family planning impact were sent to each user. During the pilot period, 2,870 and 4,817 unique users accessed the m4RH system in Tanzania and Kenya, respectively. Slightly more than half of the users who reported their gender were female (56% in Tanzania and 61% in Kenya), and men represented a substantial proportion of respondents. Users were well represented across all age groups, with the majority of users 29 years of age and younger. In Tanzania, the most popular contraceptive method queried was natural family planning, followed by emergency contraception. In Kenya, condoms and natural family planning were most popular.

Lessons Learned

- m4RH can reach a broader audience than traditional family planning services, including young people and men. Therefore programs can better meet the needs of specific target populations.

- The process used to develop FP messages can be replicated for new content (HIV, maternal/child health, tuberculosis).

- Managing an opt-in information service like m4RH involves ongoing liaising with the technical partner (software developer/IT specialist) and maintaining relationships with government ministries and partners.

- After incurring start-up costs, projects like m4RH need to plan for maintenance. In order to sustain a project such as m4RH, resources are required for ongoing leasing of the short code, offering free text messages and promoting the service to new users. In addition management costs need to cover such issues as updating content and coordinating with partners.

Conclusion

The program demonstrates that family planning information can feasibly be delivered via mobile phone. Use of mobile phones to disseminate family planning information helps reach many different population segments, including young people and men, and has the potential to impact contraception and condom use behavior.

Information was excerpted from:
http://www.fhi360.org/en/Research/Projects/Progress/GTL/mobile_tech.htm
FHI_360_m4Rh_booklet_Final_pdf
L'Engle, Kelly L., et al. "Evaluating feasibility, reach and potential impact of a text message family planning information service in Tanzania." Contraception (2012).

SMS and IVR to Improve Family Planning Services

Brief Overview

Uganda has one of the highest birth rates in Africa. More than four out of every ten women wish to access modern contraception to plan their family but are not able to. Family planning alone would reduce the country's maternal mortality ratio by 33 percent. In order to make accurate information accessible and address the unmet need for family planning, Text to Change (TTC) has partnered with the Program for Accessible health Communication and Education (PACE) to implement a one year pilot program using a mobile platform.

TTC developed a flexible mobile phone platform that is able to use short message service (SMS), multimedia message service (MMS), interactive voice response (IVR), and data for spreading and collecting information. The pilot aims to tap into the enormous impact of mobile phones in Kampala, Uganda, and the combination of mass media campaign, project management, data collection, and monitoring and evaluation to enable PACE to get access to a larger group of people and increase real time interaction with its target populations. SMS and IVR are used to reach out to women, as well as check with service providers, to find out which women are using family planning.

The goals of the project are to send mobilization messages and to establish a large social network by using the power of SMS; facilitate data collection and reporting from community health workers; make it possible for users to ask simple questions to health care workers; give technical assistance to providers of technical services or community health care workers; and collect and analyze data.

The pilot began in July 2011 and has been extended to the end of 2012.

- **Geographic Coverage:**
  Kampala, Uganda
- **Implementation Partners:**
  Text to Change (TTC) is partnering with the Program for Accessible health Communication and Education (PACE).
- **Funder:**
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About SMS and IVR to Improve Family Planning Services

Through the use of SMS and IVR, the project aims to:

- Provide general information on family planning and the two most popular long term methods, namely intrauterine device (IUD) and implants;
- Provide information on which clinics can provide the services for these family planning methods; and
- Send follow up messages to those that have received IUDs and implants to encourage and remind them about their next appointment dates with the clinic.

In addition to receiving messages, users are also able to text messages asking simple questions such as where to find services or what to do in case of any concerns. They receive feedback from PACE technical staff. Each group (apart from service providers) is subdivided by language (English, Luganda, Luo, Runyankole).

The mobile platform also facilitates data collection and reporting from community health workers via SMS. For example, they receive information including the number of implants and insertions made each month, and feedback on whether PACE is adequately supporting service providers in the mobilization of clients and the provision of services.

The project also enables closed user group discussions via SMS according to geographical areas to encourage those that are happy with the services of IUDs and implants to share their experiences and lessons learned. This type of dialogue can address the myths and fears held by some users. These groups are also linked to PACE's social media platforms.

Evaluation and Results

Evaluation data is not yet available given the recent start date of the pilot. The first phase of the pilot project has been successfully implemented. IVR was initiated in February 2012, and text messages are being sent out to the women and service providers on a monthly basis. The project has been receiving regular reports from the service providers.

In addition, TTC trained PACE staff to manage the closed used group discussion platform, and PACE is currently working on creating the groups and inviting women to share their experiences of using family planning methods.

Lessons Learned

- Realizing that illiteracy rates are high, a shift in the mobile technology used from just SMS to IVR was necessary to ensure maximum understanding of disseminated information.

Conclusion

Interactive mobile solutions enable continuous engagement with the end users. Ensuring that the right contextual necessities for successful programs, simple guidelines, and good content are in place contributes to operational sustainability. Moreover, the usability of mobile phone services is user-driven with regard to language settings, user friendly interfaces, and speed of the platforms that can be used. Taking into consideration the above, various methods were used to ensure end users can benefit through the dissemination of information and encouragement of discussion among the users, as family planning methods are still very much spread through word of mouth.

Information was excerpted from:
http://projects.texttochange.org/en/project/532/
http://www.texttochange.org/blog/how-access-family-planning-services-sms-and-ivr

Text Me! Flash Me! Call Me!

Brief Overview

Given the repeated anti-MSM (men who have sex with men) attacks in the media, by politicians and religious leaders, and most recently by community vigilantly groups, it has become increasingly difficult for MSM to access health information and services in Ghana. Only a fraction of MSM that live in Ghana are being reached through peer education, HelpLine Counseling and drop-in-centers. mHealth and social media has transformed the ability of programs to reach most-at-risk populations (MARPs) or key populations (KPs) who are otherwise 'hidden'.

The USAID/GHANA Strengthening HIV/AIDS Response Partnership with Evidence-Based Results (SHARPER) project, led by FHI 360, aims to contribute to Ghana's national goal of reduction in new HIV infections by 50 percent by 2013 through delivery of an integrated project, tailored to the needs of key populations and their partners.

Launched in September 2008 under a previous USAID funded project, the Text Me! Flash Me! Helpline uses cell phone technology to provide KPs in Ghana with friendly and accessible HIV/ AIDS and other STIs information, referrals, and ART reminders through SMS and counseling services from qualified providers. These services are opt-in so only those that feel comfortable in sharing their mobile number to the project receive messages.

- **Geographic Coverage:**
  Ghana
- **Implementation Partners:**
  FHI360, under the USAID/Ghana SHARPER project, leads a team of partners which includes: The Ghana AIDS Commission, National AIDS Control Program, Ghana Health Services (GHS) and 33 Local NGOs
- **Funder:**
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About Text Me! Flash Me! Call Me!

Text Me! Flash Me! Call Me! is designed to increase KP's access to and use of friendly and confidential HIV/AIDS and other STI information, referrals, and counseling services. It is also intended to reinforce information and key messages provided by peer educators and facility-based health workers, as well as provide a safe haven for first time or shy clients to make anonymous inquiries and get help. Finally, it seeks to strengthen the referral networks and community-facility linkages within the continuum of prevention, treatment, care, and support services for KPs.

The HelpLine interventions enable clients to text or 'flash' (call and immediately hang-up which is free of charge) or call a HelpLine Counselor (HLC) on duty. Each HLC is assigned a mobile telephone, and the phone numbers and duty hours are disseminated through social networks, discrete fliers, and by peer educators. Helpline counselors call clients back within 24 hours. Through telephone counseling, HLCs provide quality and confidential information on some ten HIV-prevention centered behaviors and prevention of gender-based violence (GBV) to the said target groups.

Currently, there are a total of 30 Helpline Counselors (HLCs) based at government HIV testing and counseling/STI clinics in six regions of Ghana. They receive calls from all regions of Ghana, and thus their telephone counseling services are offered nationwide. The HLCs are nationally certified HIV nurse counselors with the National AIDS Control Program (NACP) of the Ghana Health Service. Additionally, the SHARPER Project provides training for all recruited HLCs on communication, human rights, gender-based violence (GBV), other sexually-transmitted infections (STIs), and stigma reduction. The intervention also incorporates: a HealthyLiving SMS service where weekly health messages are sent to MSM and other KPs; LifeLine service where daily ART adherence reminders are sent to people living with HIV (PLHIV); and the use of mHealth!, a smart phone social media networking to reach 'hidden' MSM

Evaluation and Results

Between October 2011 and September 2012, over 63,000 SMS contacts were made, and 9,800 clients were reached with HIV prevention information. Additionally, over 20,600 calls were made to MSM during the same period, (an average of 57 calls per counselor per month). An average call lasts twenty minutes.

Information from monitoring data of the project indicates that the main reasons for contacting the HelpLine are to access information and advice about ART, HIV, and other STIs. In addition, as part of routine monitoring of the intervention, telephone-one-on-one interviews and focus group discussions (FGDs) conducted revealed strong clients' satisfaction.

"I sometimes forget to take my medicine but these messages are serving as very reliable reminders…These messages are my second 'Nyame' (Lord)."

Lessons Learned

- Consistent key message reminders have contributed to KPs seeking appropriate and timely health information and services.
- Confidentiality and non-discrimination provides KPs (especially MSM) with an assured medium to communicate.
- mHealth provides an effective means for health message recipients to participate in health promotion by enabling them to forward SMS messages to their peers.
- Inclusion of PLHIV in the target population for the Helpline counselors has reinforced information on ART adherence and provided an avenue to seek additional psychological and emotional counseling for positive living.

Conclusion

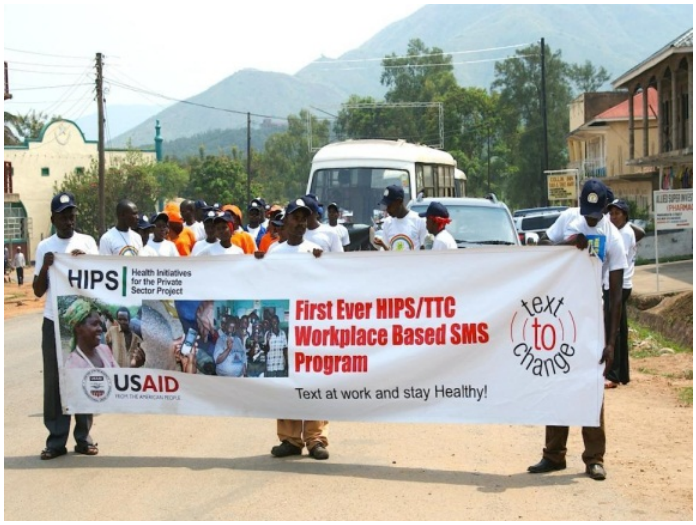
The monitoring and evaluation findings revealed that there was an increase in demand for information about HIV counseling and testing, as well as sexually transmitted infection, diagnosis, and treatment services. The SMS service and HelpLine increased clients' knowledge of and intention to use condoms and lubricants. mHealth and social media have enhanced the ability of programs to reach MARPs who are most at risk of HIV but are also the hardest to reach.

Information was excerpted from:
http://www.comminit.com/node/291748

Workplace-based SMS Awareness Campaign

Brief Overview

More than 120,000 people are estimated to be receiving antiretroviral therapy in Uganda, and HIV/AIDS prevalence is estimated at nearly six percent. Despite tremendous success in treating the epidemic, HIV transmission continues unabated. Through a pilot partnership, Text to Change (TTC) collaborated with Health Initiatives for the Private Sector Project (HIPS) to provide key prevention messages and education on HIV/AIDS to employees and community networks at three neighboring companies in Masindi, Uganda: Kakira Sugar Works, Kinyara Sugar Works, and Kasese Cobalt Company Limited.



Participants opted-in to the program by sending a SMS to a four digit number and began receiving daily texts, which were primarily interactive questions. The questions were designed to spark conversation and thought on both conventional and controversial topics, and included basic information such as age and gender.

The pilot project ran from June to August 2009. Due to its popularity and success, HIPS and Text to Change planned to expand the joint program to employees and neighboring communities of eight of the companies HIPS partners with in Uganda. Companies that are participating in the follow-up program include: Kinyara Sugar Works, Kasese Cobalt Company Limited (KCCL), Eskom (one of Uganda's largest energy companies), and Kakira Sugar Works Limited.

- **Geographic Coverage:**
  Four private sector companies in Uganda
- **Implementation Partners:**
  Health Initiatives for the Private Sector project (HIPS-USAID) partnered with Text to Change (TTC)
- **Funder:**
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About Workplace-based SMS Awareness Campaign

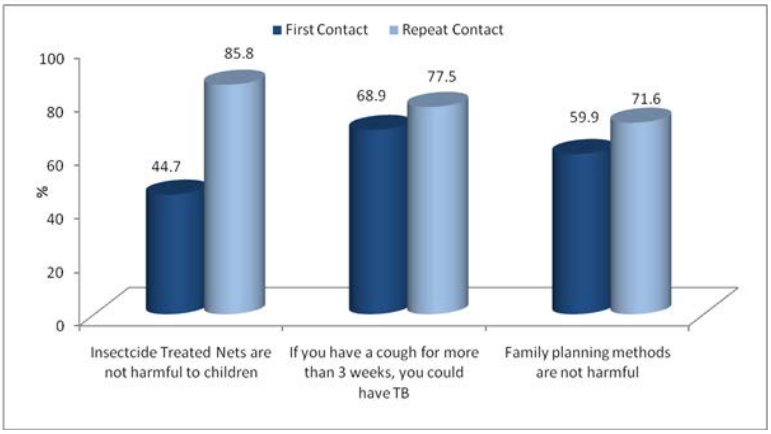
SMS messages on various selected health issues that include family planning as well as HIV counseling and testing are sent to company employees, their families and members of the neighboring communities. The aim of the program is to provide people with accurate health information, encourage people to change their attitudes and behavior, and promote the adoption of healthy practices into people's daily lives. As part of the efforts to motivate employees to join the program and use available health services, simple gifts that included airtime, phones, and t-shirts are given out to participants. These are lucky winners who participated in a quiz, answered questions correctly, or took up services for the first time.

In addition to providing information, text responses have generated baseline data on knowledge, attitudes, and practices (KAP) concerning safe sex, medical male circumcision (MMC), family planning, and HIV/AIDS transmission from 1,380 respondents in the three partner companies during the pilot period.

Evaluation and Results

In order to understand the impact of the program on knowledge levels, TTC conducted a quiz via text message with 3,099 participants in the program. In 2010, a total of 35 health related questions were sent to the group. TCC identified three questions which participants had difficulty answering correctly and resent them to the same cohort one year later in 2011.

Participants replied free of charge to the toll free shortcode with their true or false answer. If the participant replied incorrectly, he or she would receive a new message with the right answer and some additional information. For all three questions there was a significant increase in knowledge levels. On the malaria related question, there was a 41 percent increase in the number of correct responses, while on the TB and family planning questions, correct responses increased by nearly ten percent and 12 percent, respectively.



Lessons Learned

- Include local radio to promote the SMS campaign. This was not included in the pilot budget, but the combination of radio and SMS has proven to be very effective.
- Encourage involvement from the company. Although each company had a platform at hand and was encouraged to use this platform for company related messages, the platforms were not used for this.
- Organize brief interactive meetings between peer educators and participants to evaluate the SMS quiz and participation among workers.
- Due to knowledge gaps, some of the topics might require more attention in future awareness campaigns.
- The human resource manager at Eskom has indicated that some questions were too easy for the participants at Eskom. However, results do not show that participants at ESKOM have more correct answers on all topics, so this may be something interesting to feedback to the company.

Conclusion

The HIPS and TTC SMS program has shown many interesting results and promise for health interventions. In addition to HIV/AIDS and family planning, workplace-based text messaging can be used to encourage healthy behaviors and treatment-seeking for malaria, tuberculosis, childhood illnesses, and others. Early experiences from the initiative indicate the vast potential to expand health text messaging in the workplace and elsewhere.

Information was excerpted from:
http://www.texttochange.org/sites/default/files/newsfiles/TTC%20HIPS.pdf
http://www.texttochange.org/news/research-shows-health-knowledge-levels-rural-uganda-increase-simple-sms

Automating Data Collection for HIV Services

Brief Overview

Faced with the high costs of printing and couriering paper client records, with a high data entry burden, and inconsistent quality of reporting, many programs are turning to electronic data capture solutions to improve efficiency and lower costs. Indeed, a project's reporting requirements may involve multiple paper-based tools used to collect client information, laboratory testing results, and supervision data. Client Intake Register (CIR) forms are often incorrectly or incompletely filled out by staff, while the large data entry burden regularly results in delays in reporting. Because of rising client volumes, it can become increasingly expensive to print client record forms, pay for courier services, and even pay for data entry (data entry might be outsourced to research agencies).

Population Services International/Zimbabwe (PSI) annually provides counseling and testing (VCT) services to over 350,000 people through its network of 17 VCT sites. To lower costs and improve the data entry process, PSI/Zimbabwe piloted the use of tablet computers for data capture in its *New Start* Centers and by outreach teams. A pilot was conducted during the second half of 2011 in three sites.

- **Geographic Coverage:**
  Three sites in Zimbabwe
- **Implementation Partners:**
  Population Services International
- **Funder:**
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About Automating Data Collection

A Windows-based application was developed by a consultant and includes a data collection tool with digital CIR forms, a data management interface, and export functionalities. Key system requirements were that it should be a scalable system, allowing for easy upload of client records to a central repository, the incorporation of logical skip patterns and coherence tests into the data collection forms, and interconnections between tablets in order for multiple counselors to have access to all information of a particular client.

Suitable hardware was identified and the system was deployed and tested at three *New Start* clinics for a period of three months; 12 counselors were trained on the use of the tablets and of the application. Each team of about 10 devices was to have its own WLAN hub with one of the tablets acting as the back-end server for synchronization purposes. Technical support was provided throughout the pilot by the IT and MIS units and by the consultant.

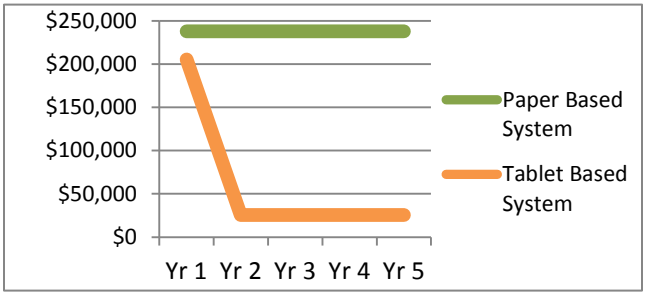
Evaluation and Results

The successful pilot highlighted the value technology will bring to the testing and counseling department while significantly reducing the cost of the data collection process. During the pilot, the IT/MIS team successfully created a user-friendly digital data collection form for the client intake forms, and designed a system that allowed for networking of responses among the multiple clients and sharing of client records between counselors. All 54 variables required for statistical analysis and reporting purposes were successfully exported into SPSS. The forms can be paused and resumed at any time, and include built-in logical skip patterns.

Currently PSI is installing the system in all of its 17 *New Start* clinics, soon to be followed by the organization's *New Life* sites (provision of post-test support services). Phase one of the implementation plan is now completed, with five sites now exclusively using tablets for VCT record keeping (following a transition period during which both digital and paper records were kept). During the pilot, CIR printing, data entry and courier costs were significantly cut.

Estimated cost comparison over five years

Source: Population Services International, 2012



Lessons Learned

- Users struggled with navigation of Windows 7, which requires additional training.
- Device to device network (15m radius) did not work well. Each site and outreach team needs to have a Wireless Local Area Network (WLAN).
- Battery life problems can be alleviated by including battery packs and solar chargers in the hardware requirements and using tablets that are less power-intensive.
- Windows 7 licenses are very expensive. Revised forms will be developed in a Java-based application compatible with Android operation system, resulting in lower price for equipment and no more license fees.
- Securing the devices is difficult. Counselors have to carry the device around and then store them in the safe after hours.
- Adequate IT resources and IT support staff is required to set up and run the system.

Conclusion

Using tablets to collect data can result in improved data quality, faster data collection, near real-time data and timely reporting of client records on monthly basis, and is less costly, despite high initial set-up costs. Tablets can also be used for data collection and reporting by field staff such as IPC agents, medical detailers, or community health workers.

Child Status Index (CSI) Mobile App

Brief Overview

High child mortality rates in Malawi remain a challenge despite progress in recent years. D-tree International is a technical assistance parnter in the USAID-funded "Integrated (HIV Effect) Mitigation and Positive Action for Community Transformation" (IMPACT) project, which is designed to improve the quality of life of orphans and vulnerable children (OVC) in targeted districts of Malawi. One of the two mobile applications that D-tree designed in order to support IMPACT is based on the Child Status Index (CSI), an international paper-based case management tool for assessing the well being of children developed by MEASURE Evaluation. D-tree developed the CSI mobile application to digitally collect information from CSI assessments, prompt for referral, and track follow up care within the community. The CSI mobile application was designed for use by the secretaries of community-based OVC committees to enter data from the paper CSI forms into the digital platform on their mobile phone.

The IMPACT project is being implemented from June 2010 to June 2014, and the last CSI mobile application training was completed in July 2012. A total of 104 OVC committee secretaries were trained on the use of the application, and it has been implemented in three districts in Malawi.

- **Geographic Coverage:**
  3 districts in Malawi
- **Implementation Partners:**
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Child Status Index (CSI) Mobile App

About CSI Mobile App

The stand-alone application was developed on the CommCare platform and runs on a java-enabled phone that OVC committee secretaries use offline. OVC committee secretaries enter information collected by family care volunteers using the paper-based CSI tool, which was developed to assess the wellbeing of vulnerable children. It is based on six domains, such as wellness and education, with 12 measurable goals on which a child is scored in a range of four (good) to one (very poor). If a child scores very low on a certain goal (score = one), immediate referral is made to assist the child. The mobile application implements the Child Status Index tool, (both in English and the local language Chichewa), and especially supports users in making decisions about appropriate actions for children scoring low on a particular domain, as well as on following up.

On a daily or weekly basis, OVC committee secretaries send their completed data to a server using general packet radio service (GPRS), a packet oriented mobile date service which is many times less costly than SMS, for storage, backup, and reporting. CSI data is then available for IMPACT project staff to import into the project's Management Information System (MIS), rather than having to wait for the paper forms to come from the field and to be entered into the MIS manually.

Evaluation and Results

During an early analysis of CSI data, a random sample of 204 paper-based forms and mobile application data was analyzed and compared in detail. The data analysis showed that phone users made data entry mistakes on just over five percent of the forms, but this figure is expected to decrease once users become more proficient with the application over time. It furthermore revealed inconsistencies and missing information on nearly seven percent of paper forms, while the mobile application did not permit users to omit scores or referral information, and therefore collected more complete data. The use of the application also resulted in reduced loss-to-follow-up (LTFU) of children with active referrals as the phone reminds users on outstanding cases whereas paper-based forms are often filed.

Through the use of the application, data from villages is now being received in a much timelier manner as the wait for paper forms to arrive and to be tabulated has been eliminated. Additionally, manual data entry is no longer required since the reports are all available from the server, saving considerable time and money.

However, analysis also revealed that with the expansion of users, the implementation of the CSI application posed several challenges. It became evident that the technological competence and formal education level of CSI users influenced their performance with the phone, and as a result, the data that was being collected with the mobile application was of poor quality and therefore of limited use. Data error entries have consequences for program quality, and resolving them requires comparing data from the phone with the paper forms, which is a labor-intensive activity. Because of these challenges, it was decided during the IMPACT annual reflection meeting to not continue with the implementation of the CSI application with the existing user group. Instead, the IMPACT program is currently considering other user groups and methodologies (e.g., point of care vs. data collection).

Lessons Learned

- The current cadre of users (OVC committee secretaries) is not working as well as cadre of users that work on the frontline delivering care.
- The application seems more appropriate for point of care use (use by social workers during the visit with the child), as opposed to data collection.
- If the phone is directly associated with service provision, such as in a village clinic, the intervention is better received.
- Particularly in peri-urban areas, the security of phones can be a challenge.
- Older users can face vision challenges that may prevent them from using the phone effectively. Eyesight testing/corrective lenses should be included in the recruitment of users.

Conclusions

The CSI application has the potential to improve support to vulnerable children and reduce loss to follow up. However, its success is dependent on careful consideration of the user group and methodology. It is critical for programs to objectively assess whether applications provide intended benefit as effectively as envisioned and make corrections/changes where needed.

Information was excerpted from:
Geldof, Marije. March 2012. Child Status Index & Community Case Management mobile applications. D-tree International
http://www.d-tree.org/our-projects/ovc-and-community-imci-malawi

EpiSurveyor/Magpi

Brief Overview

EpiSurveyor is a mobile data collection system used in more than 170 countries across the full spectrum of international development sectors, including health. Designed to be user-friendly, it has more than 10,000 users worldwide. An updated version will be launched in January 2013 under the name, Magpi. This version will have greater speed and over 40 new features: mapping and improved analysis, data collection, sharing, and form design.

Programmed and supported by DataDyne, EpiSurveyor is available free. It is funded entirely through premium subscriptions paid by less than one percent of its users.

- **Geographic Coverage:**
  170 countries across sub-Saharan Africa, Latin America, and the United States.
- **Implementation Partners:**
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About EpiSurveyor/Magpi

EpiSurveyor is a free mobile phone and web-based data collection system used by the health, agriculture, education, conservation, and commerce sectors. The application can be used for clinical patient data, public health and epidemiology information, to track supplies and medicines, for household surveys, as well as for non-health-related information.

Within the health sector it is used to collect information for clinic supervision, vaccination coverage, or outbreak response. It is also used to collect data that helps to identify and manage public health threats such as HIV/AIDS, malaria, and measles.

EpiSurveyor incorporates web-based software for designing forms and viewing data, and a mobile phone application for data collection (even without internetconnectivity) on Symbian phones, Blackberries, iPhones, Android phones, or via the use of SMS for basic data collection on *any* phone.

Forms are designed online, and then wirelessly downloaded to phones. Data is collected on the phones (even when there is no network connectivity). Data is sent via the internet to a remote server where it can be viewed and downloaded from any computer with internet access.

Mobile data collection with EpiSurveyor decreases costs compared to the use of paper forms and eliminates the time required to transfer data from paper forms to computers. It also increases data quality with data quality controls that can be easily implemented within the data entry forms.

Evaluation and Results

Since launching the current online version of EpiSurveyor in June 2009, more than 10,000 users in 170 countries have collected over a million data records. Evaluations of EpiSurveyor have demonstrated reduced time and costs and increased data quality. The World Bank conducted an evaluation of EpiSurveyor in Guatemala that found a 71 percent decrease in costs compared with paper.

Lessons Learned

EpiSurveyor has demonstrated that the major obstacle to adoption of useful ICT in development is the cost associated with using programmers and technology consultants when applications are not designed to be user friendly or for limited resource settings. By carefully designing the software to obviate the need for technical support and basing the application in the cloud, DataDyne has reduced the cost of gathering and storing data electronically and made it accessible to a wide range of users.

Conclusion

EpiSurveyor is an effective tool for reducing the cost and time inefficiencies associated with collecting data on paper, while enabling greater quality control. It is highly suited for settings with limited internet connectivity and for use in remote areas.

Information was excerpted from:

Global Polio Eradication Initiative http://healthmarketinnovations.org/program/global-polio-eradication-initiative-gpei
EpiSurveyor Mobile Health Data Collection http://mhealthinfo.org/project/episurveyor-mobile-health-data-collection
Mobiles combat Kenyan polio outbreak http://news.bbc.co.uk/2/hi/technology/7619473.stm
EpiSurveyor Brief http://bit.ly/esbriefpdf ; www.datadyne.org
Case Studies https://datadyne.zendesk.com/entries/21282536-case-studies-who-uses-episurveyor
http://siteresources.worldbank.org/INTLAC/Resources/257803-1269390034020/EnBreve_166_Web.pdf
Photo Credits: *DataDyne Group LLC*

Integrated Health Systems Strengthening Project – IHSSP: RapidSMS

Brief Overview

The Rwandan health care system has made significant progress on reducing maternal and child mortality over the past ten years. According to the demographic health survey (DHS) the both the maternal mortality ratio (MMR) and the infant mortality rate were cut by more that 50 percent. The MMR decined from 1070/100,000 live births in 2000 to 476 in 2010 and the infant mortality rate declined from 107 to 50. However, data shows that most maternal deaths still occur at community level: 33 percent of women died before giving birth, 44 percent were aged between 21-30 years old and 45 percent had had more than three pregnancies.

In order to better identify and manage the health issues of at risk newborns and mothers, Management Sciences for Health (MSH), under the Integrated Health Systems Strengthening Project (IHSSP) worked with Rwanda's Ministry of Health and UNICEF to implement a mobile phone-based tool for community health workers to use with their clients. The RapidSMS application follows national and international guidelines of care, helping community health workers (CHWs) to closely monitor pregnant women from through the duration of their pregnancy and providing guidance on the provision of care, especially related to high risk situtations. As a result of RapidSMS, there has been increased use of the formal health system by pregnant women and this has been demonstrated to have a positive health impact on mothers and their children.

Initially introduced in one of Rwanda's thirty districts, the system has now been rolled out nationwide. It has also been integrated into the national eHealth Enterprise Architecture Framework, exchanging data on risk factors with the national shared health record.

- **Geographic Coverage:**
  Rwanda, Nationwide (30 districts as of 2012)

- **Implementation Partners:**
  Rwanda Ministry of Health,UNICEF, Management Sciences for Health led a team of partners which included: Boston University | Cordaid | Futures Group International | Health Development & Performance (HDP) | Healthnet International | IDEAS | Intrahealth

- **Funder:**
  UNICEF, USAID, Government of Rwanda

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Integrated Health Systems Strengthening Project - IHSSP: RapidSMS

About RapidSMS

RapidSMS is a cell phone-based technology designed to save newborns and mothers though routine surveillance of health events by CHWs. The system relies on simple text messages that are composed by CHWs to report specific events during the course of a woman's pregnancy, delivery, and the first year of the infant's life. At the national level, these messages are incorporated into a web-enabled database. If the reported event indicates a risk for the mother or child, the system automatically sends a short SMS reply to the CHW notifying them of specific actions to take. In some villages, the CHW's mobile phone is also the most direct method of communication for patient referral and emergency transport through the nation's ambulance service (SAMU).

The application runs on an open source software platform Ubuntu Linux server, the MySQL database and is programmed using the Python language. Any cell phone can be used since it relies only on SMS messaging. In addition the system has a web-based graphical user interface that allows supervisors at the district and national levels to monitor use of the system, configure the system and broadcast SMS messages to CHWs.

In order to implement RapidSMS, IHSSP procured and distributed 10,000 cell phones to CHWs. These were combined with another 30,000 phones provided by other donors and distributed to all CHWs. MSH coordinated the development of a national training curriculum and approximately 1,000 people, including data managers and CHW coordinators from nearly 450 health centers, were trained in the use of RapidSMS. These trainers subsequently organized training on the application for the CHWs in their catchment areas. All CHWs from a health center's catchment area meet monthly to discuss progress and review feedback from RapidSMS and the CHW Health Worker Information System (SIScom).

Evaluation and Results

A study of RapidSMS in Musanze district, located in the north of the country, demonstrated appreciable results in improving maternal and child health. One year after the launch of RapidSMS, prenatal care visits increased by 25 percent, home deliveries decreased by 54 percent, while deliveries at health facilities increased by 26 percent. Health officials believe that the system also contributed to reducing the under-five deaths by 48 percent. (Data from the Musanze District Hospital).

The use of RapidSMS also contributed to:

- The instant transmission and analysis of data which is immediately accessible to all stakeholders;
- A decrease in data entry error rates through a feedback loop system identifying data outside normal parameters and verification with end-users; and
- Improved monitoring capacity at the clinic, district and national levels.

Lessons Learned

- Community health workers at the front-lines of health service provision in Rwanda and can benefit from mHealth activities.
- In spite of their limited educational background and difficulties manipulating cell phones for the first time, CHWs quickly adapted to the technology.
- Regular feedback sessions are required to continually improve CHWs skills and share the successes and difficulties encountered.
- Phone maintenance and charging in areas without electricity can be a challenge.
- The use of solar chargers in areas without regular electricity can further use of mHealth applications.

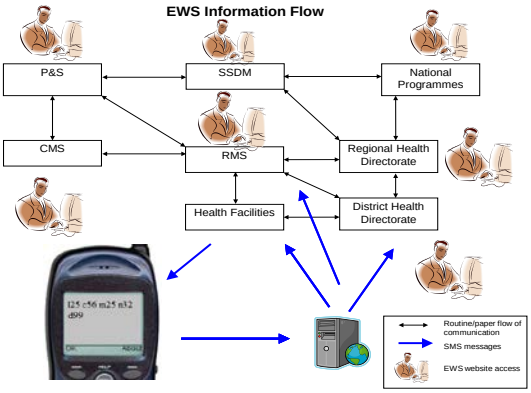
Conclusion

Clear progress has been documented in maternal and child health in Rwanda by the recent demographic and health survey (DHS 2010). However, maternal and child deaths are still high. Increasing the use of interventions, which target maternal and child health, has been a national priority for the Rwandan government. Mobile phone-based applications, such as RapidSMS, show great potential for supporting health workers at the lower levels of the health system. These mHealth tools can assist CHWs in facilitating access to health services for the population and in turn improving health outcomes.

Information was excerpted from:
http://intranet.msh.org/news-and-events/news/news-story.cfm?customel_datapageid_600=69167; RapidSMS Rwanda - http://healthmarketinnovations.org/program/rapidsms-rwanda; Saving Mothers and Newborn lives in the community using RAPIDSMS technology – Exerience from Musange District of Rwanda: Dr. John Kalachi, District Hospital of Ruhengeri, Musange; International Conference on Community Health, Kigali 25-28 January, 2011

Early Warning System

Brief Overview



Access to essential medicines and supplies at the last mile (i.e., service delivery points) is fundamental to the good performance of any health care delivery system. This calls for, among other things, the existence of an operational health supply chain system with a workable logistics management information system (LMIS) that routinely and systematically churns out data needed for important decisionmaking at all levels of the supply chain. Complementing a functional LMIS with mobile technology can help address some of the health supply chain challenges, which include irregular and haphazard requisitions, and late and incomplete reporting of stock status at the last mile that have resulted in occasional stock outs of essential health commodities at the service delivery point.

The mobile phone-based Early Warning System (EWS) began in July 2011 and is currently being piloted in over 200 health facilities in all 10 regions of Ghana. The USAID-funded Focus Regions Health Project (FRHP) supports implementation in all Ghana Health Service health facilities, including hospitals, health centers, and community-based services, in three regions with the USAID | DELIVER PROJECT supporting implementation in the other seven regions. Participating facilities include all regional hospitals, select district hospitals, select health centers, and community-based health planning and services (CHPS).

- **Geographic Coverage:**
  Ghana

- **Implementation Partners:**
  Ghana Health Service | USAID Focus Regions Health Project (JSI Research & Training Institute, Inc.) | USAID | DELIVER PROJECT (JSI)

- **Funder:**
  USAID, through the Focus Regions Health Project (FRHP) and USAID | DELIVER PROJECT

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About Early Warning System

In an effort to address some of the challenges confronting the health supply chain in Ghana, two USAID funded projects—the Focus Region Health Project (FRHP) and the USAID | DELIVER PROJECT—collaborated with the Ghana Health Service to take advantage of recent advances in mobile technology to enhance logistics data reporting, visibility, and utilization for improved supply chain functioning.

The Early Warning System (EWS) involves the use of mobile phones by health facility staff to report stock levels of 27 tracer commodities (HIV, malaria, and family planning) via SMS to a dedicated short code on a weekly basis. By logging in to the EWS website through the Internet, Regional Medical Stores are also able to input their stock levels for the 27 tracer commodities. Data is then processed and immediately made available to all relevant participants on a website accessible to all program managers and participating providers.

This information helps managers to intervene when there is problem and determine appropriate interventions to improve the availability of health products.

Evaluation and Results

The pilot was assessed after six months of implementation. Below are some of the major findings and conclusions.

Providing near real-time stock status

With the introduction of the EWS, there is improved visibility of stock status data from facilities through the weekly submission of the stock status report. This provides real time stock status information for management use. An improvement in the reporting rates will certainly improve visibility of stock status situations of many more facilities.

The proportion of facilities reporting that have stocked out of any commodity decreased from 32 percent in July 2011 to 24% by November 2011. It is believed that stock-out rates would have been even lower but for the erratic availability at the national level of some program commodities, including family planning commodities during that period.

Visibility of Stock Status

By clicking on the stock status levels on the EWS website, a manager is able to view the stock levels at the regional level and down to the facility level.

Lessons Learned

- The EWS improved the visibility of stock status for family planning, PMTCT, and malaria commodities at the facility and Regional Medical Stores levels.
- Inventory management practices improved; for example, about 81% of facilities maintained tally cards for PMTCT commodities and 70% of such cards were updated.
- Initially, timely reporting rates were not very encouraging in some of the regions; however, reporting improved after supportive supervision to sites.
- Stock-out rates have been erratic as some commodities have seen declines in stock-outs while others have seen escalations. Availability of stocks at service delivery points (SDP) depends on a full pipeline.
- Stakeholders were highly involved at every stage of the development process. This involvement sets the stage for a successful implementation of the system.

Conclusion

The mobile phone-based EWS pilot made key SDP logistics data available in real time. Given the challenges faced by Ghana's paper-based logistics data reporting system, this pilot demonstrated that mobile technology presents a viable solution.

The system is being upgraded to make it more user friendly and also to ease report generation. Once the necessary upgrades and improvements are completed, the EWS will make it easier for managers to access and use facility-level stock status information to guide their decisions as they work to improve the availability of essential medicines and supplies at the last mile.

Information was excerpted from:
http://www.jsi.com/JSIInternet/IntlHealth/project/display.cfm?ctid=na&cid=na&tid=40&id=4061

Changamka Maternal Health Smartcard

Brief Overview

In Kenya, the maternal mortality rate is high with approximately 488 maternal deaths per 100,000 live births (according to UNAIDS data from 2008/9). Only 47 percent of women make the recommended four or more antenatal care visits, while just 44 percent receive skilled care during delivery. Inadequate access to health care services, low levels of education about the importance of skilled care during childbirth, poverty, and apathy towards health insurance are just some of the many factors contributing to maternal deaths.

In 2008, in order to improve access to affordable healthcare, Changamka MicroHealth Limited ('Changamka') introduced the medical smartcard, a mobile technology solution that enables users to save money over an extended period of time to gain access to primary health care services. Clients save for health care expenses using a medical smart card combined with mobile money transfer service systems such as M-PESA and make payments at designated providers for goods and services at pre-contracted prices. Changamka offers two products to the general public: the out-patient smartcard and the maternal health smartcard. Changamka also offers a smartcard for third party payers schemes, aimed primarily at reproductive health schemes that utilize vouchers, and an in-house smartcard for instutions and universities that run their own health clinics.

In partnership with Pumwani Maternity Hospital, the largest maternity hospital in Sub-Saharan Africa, Changamka piloted the maternal health smartcard between July 2010 and September 2011. Over 3,500 cards were distributed. Today, the maternal health smartcard is used at nine private hospitals in Nairobi and at hospitals in Mombasa and Naivasha.

- **Geographic Coverage:**
  Kenya
- **Implementation Partners:**
  Changamka MicroHealth Limited is leading a team of partners including:
  Safaricom | Pumwani Maternity Hospital | Vodaphone | GA Insurance
- **Funder:**
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Changamka Maternal Health Smartcard

About Changamka Maternal Health Smartcard

The maternal health smartcard is a pre-paid card that allows the bearer to obtain ante-natal, delivery, and post-natal services at listed prices in participating maternity facilities. The card is available at participating hospitals for 250 Kenyan Shillings and can be topped up by M-PESA or at the hospital terminal kiosk. The bearer has up to nine months in which to save the amount required for delivery at their facility of choice as long as it is accredited.

The maternal health smartcard provides a dedicated savings mechanism for the mother to be that is convenient, safe, affordable, and user friendly. Each maternal health smartcard is personalized, does not expire, absorbs deposits, has no deposit limit, and can only be used to pay for health services.

Evaluation and Results

A study conducted by the USAID-funded Strengthening Health Outcomes through the Private Sector (SHOPS) project analyzed the benefits, challenges, and potential opportunities associated with Changamka's maternal health smartcard. The study utilized in-depth interviews with a subsample of survey respondents.

The study compared the experiences of smartcard users to that of the comparison group (women who obtained Pumwani Hospital services before or after 15 months when the card was offered) and found the following:

- The average card user made 4.3 ANC visits, 14 percent more than comparison group (statistically significant difference across education and income subgroups); and
- Card users were more likely to have at least four ANC visits (the WHO recommendation).

Among card users:

- 78 percent found the smartcard convenient to use;
- 60 percent said the smartcard helped them to pay for services and leave the hospital more easily;
- 80 percent said that it was safer to carry the smartcard than to carry cash;
- 87 percent thought it was more convenient than M-PESA;
- 75 percent said the smartcard helped them save money by not letting them spend it on other things;
- 15 percent said the smartcard helped by preventing their families from spending the money on other things; and
- 97 percent gave birth at a health facility.

In total, six percent of smartcard users engaged in genuine savings and two-thirds of savers used cards for deliveries. While discontinuation of card use was high, and only a small portion of card recipients made savings deposits on the card, the study highlights substantial latent demand and appreciation for certain features of the card.

Lessons Learned

- Partnerships are critical to success. Changamka relies on the convergence of what it calls the "3Ms" (mTechnology, mMoney, and mHealth) and survives due to its partnerships with Safaricom, Vodaphone, and the networks of participating hospitals and clinics.
- The cost of smartcard terminals at 400 US dollars and the cost of smartcards at two US dollars each are in most cases prohibitively expensive and a barrier to expansion.
- There is need for awareness creation, research, and monitoring and evaluation

Conclusion

The Changamka - Pumwani pilot demonstrated that an initiative allowing poor people to contribute to their healthcare can be successfully implemented in resource-constrained settings. The widespread availability and use of cell phones in Kenya provided the impetus for the development of this mHealth initiative and is central to its success. In 2012, Changamka upgraded its technology to bring on board a web based platform with mobile application integration to address the financial barriers to scalability posed by the terminals and smartcards.

Information was excerpted from:
http://changamka.co.ke/html/news%20&%20events.html
http://www.ke.undp.org/index.php/mdgs/goal-5-improve-maternal-health
http://www.healthunbound.org/content/changamka-medical-smart-card
http://shopsproject.org/sites/default/files/resources/Changamka%20Presentation%20at%20HSR%20Symposium%20in%20Beijing.pdf

Mobile Finance to Reimburse Sexual and Reproductive Vouchers

Brief Overview

Maternal health in Madagascar has improved across the country since the 1990s. Between 1990 and 2008 for example, the number of maternal deaths per 100,000 live births went down by 38 percent; from 710 to 440 maternal deaths per 100,000 live births. The improvement in maternal health is, in part, the result of increased contraceptive use. For example, the rate of modern contraceptive use among married women in Madagascar increased from five percent in 1992 to 29 percent in 2008-2009. However, 18.9 percent of married or cohabiting women in Madagascar still have an unmet need for voluntary family planning. Many women also lack access to other sexual and reproductive health services, including prenatal care or the services of a health professional during childbirth.

Under the SHOP's project, Marie Stopes Madagascar (MSM) established a subsidized voucher program to increase poor people's access to voluntary family planning services. Clients could give the voucher to one of MSM's 42 social franchisees in Itasy or Bongolava, two rural regions in Madagascar, in exchange for family planning services that would normally cost between 4,000 and 10,000 Ariary (between US$2 and US$5).

MSM used mobile phone-based short message service (SMS) money transfer systems instead of traditional payment methods to reimburse service providers. In doing so, MSM's voucher program demonstrated that SMS money transfer systems can successfully reimburse health service providers in remote, rural and urban settings.

The program began in October 2010. Data collection occurred between February and July 2011.

- **Geographic Coverage:**
  Madagascar
- **Implementation Partners:**
  Abt Associates, through the SHOPS Project, leads a team which includes Marie Stopes International
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Mobile Finance to Reimburse Sexual and Reproductive Vouchers

About Mobile Finance to Reimburse Sexual and Reproductive Vouchers

Health Network International (HNI) developed an online database that uses MySQL and the operating system Linux, which collects and analyzes data sent via SMS, send automated text messages via SMS, and manage the claims process required for the voucher program.

Prior to the voucher program's launch, MSM supplemented the core training provided to all social franchisees with additional training focused upon the services available to voucher holders, client referrals, the reimbursement process and the SMS money transfer system.

Each social franchisee receives 7,500 Ariary (US$3.70) for any contraceptive method and counseling or referral they provide to clients in possession of a subsidized voucher. This payment includes the standard rate for sending the SMS to MSM as well as the cost to social franchisees of withdrawing money from an account.
This payment excludes the cost to MSM for transferring funds by SMS to social franchisees. This latter cost varies from 5-18 percent, depending upon the SMS money transfer system used. To receive this payment, social franchisees are required to send the unique code on a client's voucher by SMS to a phone number linked directly to MSM's online database.

Evaluation and Results

Between February 2011 and the end of July 2011, MSM distributed 5,950 vouchers. By the end of July 2011, the unique code of 1,737 (29%) of the vouchers distributed by MSM had been submitted using SMS by social franchisees for reimbursement. The SMS money transfer systems incorporated by MSM into its voucher program are successfully reimbursing social franchisees for services they deliver to clients in possession of a voucher. All of the unique codes submitted by social franchisees have been reimbursed by MSM. In total, 599 (35%) of the 1,737 claims for reimbursement sent by MSM's social franchisees were reimbursed within 48 hours. Furthermore, no discrepancies have been identified between the codes submitted by SMS and the codes on the parts of vouchers retained by social franchisees and cross-checked monthly by MSM

Lessons Learned

- Important to conduct an analysis of mobile phone use and SMS money transfer systems available to ensure access to this reimbursement method.
- Program managers should undertake a comprehensive cost/benefit analysis of the SMS money transfer system.
- Program managers should design and map the reimbursement process to identify the team members and tasks.
- Program managers should ensure that this method of reimbursement is supported by a password-protected database capable of collecting and analyzing data sent via SMS.
- Voucher codes should not be lengthy to reduce error and to simplify the process.
- Toll-free number should be obtained so that end-users can submit reimbursement claims without incurring extra costs.
- Program managers should ensure that all final payments are made using a computer to limit data entry mistakes and so that payments can be easily tracked and audited.

Conclusion

SMS money transfer systems can significantly strengthen the reach, efficiency and sustainability of health services. The method of reimbursement used by MSM can be replicated in other countries. SMS money transfer systems have been introduced in more than 60 countries worldwide and more are planned. One in 10 of these SMS money transfer systems has one million or more users.

Information was excerpted from:
http://www.mariestopes.org/sites/default/files/12pp_Marie%20Stopes_Mobile_Money%20FINAL.pdf

cStock

Brief Overview

Hard-to-reach communities in Malawi rely on community health surveillance assistants (HSAs) to provide quality medicines and services for the treatment of childhood illnesses. However, these HSAs frequently experience stock outs of essential medications. The Improving Supply Chains for Community Case Management of Pneumonia and Other Common Diseases of Childhood Project (SC4CCM) is a five year project funded by the Bill & Melinda Gates Foundation that focuses on finding affordable, simple, and sustainable supply chain solutions that address the unique challenges of community health workers.

cStock is a rapid SMS, open-source, web-based system that was custom designed by SC4CCM and the Malawi Ministry of Health (MOH) to resupply, monitor and manage community-level essential medicines and commodities for child health, family planning and HIV testing. The system allows HSAs to transmit information regarding their supply of nineteen essential medicines to the health center. This community level information is also available to decision makers at all levels of the system.

The project started in November 2009 and runs until October 2012 and works in Ethiopia, Malawi, and Rwanda.

- **Geographic Coverage:**
  Malawi
- **Implementation Partners:**
  Supply Chains for Community Case Management Project (SC4CCM), John Snow International (JSI)
- **Funder:**
  Bill & Melinda Gates Foundation
- **For More Information Contact:**
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  - **Yasmin Chandani, Project Director;**
    1616 N. Fort Myer Drive, 11th Floor, Arlington, Virginia, USA 22209;
    Tel: +703-528-7474; email: yasmin_chandani@jsi.com

About cStock

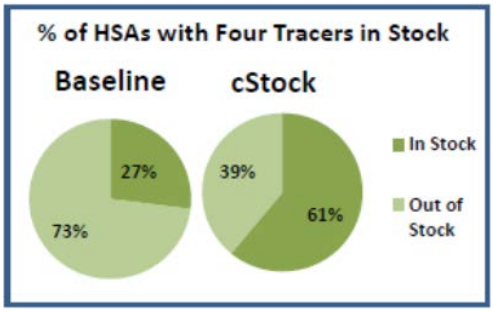
To address the lack of data visibility in the supply chain, SC4CCM worked with MOH and partners to create cStock. Each community-based HSA was trained in cStock to report commodity information via SMS. cStock automatically calculates the resupply needs for each HSA based on reported stock levels and transmits this data to the health center, enabling health center staff to pre-pack orders and text the HSA when orders are ready.

In addition, cStock alerts higher level staff via SMS if supplies cannot be replenished or an HSA remains at low levels of stock despite being resupplied. Data is available via a web-based dashboard that provides timely visibility into actual stock levels held by HSAs, enabling real time identification of problem areas and overall monitoring of supply chain performance by the district and central level administration.

To launch the system, MOH Malawi and SC4CCM partnered to provide one day of training to HSAs, health center staff and district staff on using cStock. It is essential that staff at all levels of the system understand their role in the system. As cStock is more than a one-way reporting system, each person needs to fully understand how to respond in a timely way.

Evaluation and Results

The formal program evaluation will begin in January 2013, thus the information below are preliminary result from a smaller sample obtained during regular monitoring of activities. Results from monitoring visits found a two-fold increase in the percent of registered HSAs who had four essential medicines (cotrimoxazole, Artemether, lumefantrine and ORS) in stock; these drugs were used as "tracers" to monitor general availability of supplies. As illustrated below, in the first quarter of the project 61 percent of HSAs had the four "tracer" products in stock during the monitoring visit compared to only 27 percent before cStock was implemented.



Additionally, there was a significant adoption of cStock among HSAs. After cStock was implemented 97 percent of HSAs reported logistics data to their respective health center compared to only 43 percent prior to cStock. Supervisors also reported HSA collection of supplies also improved with approximately half of all HSAs collecting products within one to two days of receiving a message that products were ready. One additional encouraging outcome was that access to cStock appeared to motivate HSAs without phones to quickly purchase phones to be able to access the system.

Lessons Learned

- Having good visibility into the messages received from HSAs on the cStock website was critical so that data entry errors, like using the letter 'O' rather than the number zero (0), could be quickly identified and addressed.
- HSA trainings should be done in pairs: one who knows how to write and send SMS messages can be a mentor to one who cannot.

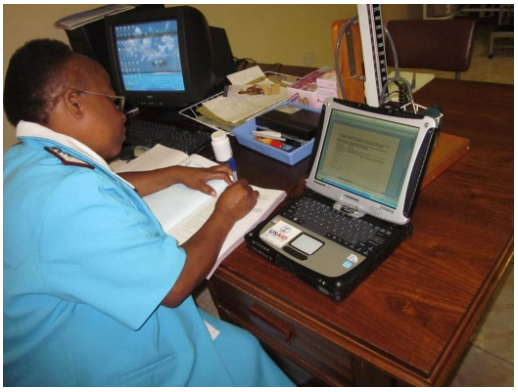
Conclusion

Given SC4CCM's focus on sustainability, the project decided not to provide phones to HSAs, to minimize risks to the long term effectiveness of the system. One positive and encouraging outcome was that access to cStock appeared to be a motivating factor; some HSAs who arrived at the training without phones used their per diem to purchase phones so that they too could use cStock. This not only underlines their trust and commitment to invest in the system but will improve their communication regarding supplies and enable them to better communicate with clinical supervisors, friends and family.

Information was excerpted from:
cStock: Creating an SMS system to improve supply of
child health medicines for CCM in Malawi: http://sc4ccm.isi.com/Docs/MwSC4CCMcStock 9.12.11 1 1.pdf

Delivery Team Topping Up System (DTTU)

Brief Overview



To ensure the availability of health commodities, countries must implement reliable supply chains with robust distribution systems. In countries described to be "fragile states," generalized disruptive turmoil (such as political instability, war, civil unrest, economic failure, or particularly poor governance) drastically weakens government systems. Both the health and transportation sectors are affected by the weakened systems of fragile states—and the health commodity supply chain is often gravely compromised.

The Delivery Team Topping Up (DTTU) system, implemented in Zimbabwe by the Ministry of Health and Child Welfare and John Snow, Inc. (JSI) through the USAID | DELIVER PROJECT, is providing solutions to the challenges faced by fragile states. The DTTU system is a distribution paradigm in which investments are made to ensure that reliable vehicles, drivers, technical staff members, or a combination of these will directly provide or "top up" facilities with the health products that they need.

Under the DTTU system, delivery trucks are filled with a predetermined quantity of a product—based on past consumption patterns—and the product is driven to health facilities. The delivery team is made up of a Team Leader, who is a staff of the Zimbabwe National Family Planning Council, and a truck driver. The Team Leader, along with staff from the health facility, conduct physical inventories of products, calculate current consumption and re-supply quantities, and "top up" the inventory of each facility with quantities needed to meet the next period's requirements.

The USAID | DELIVER PROJECT and its predecessor projects, Family Planning Logistics Management (FPLM) and DELIVER, also managed by JSI, have been working with the DTTU system since 2008, successfully employing the system to ensure reliable supply chains in areas that present logistical challenges.

- **Geographic Coverage:**
  Zimbabwe
- **Implementation Partners:**
  Zimbabwe Ministry of Health and Child Welfare; Zimbabwe National Family Planning Council (ZNFPC); DFID; USAID | DELIVER PROJECT through John Snow, Inc.((JSI); Supply Chain Management System through John Snow, Inc. (JSI); Crown Agents Zimbabwe; National Pharmaceutical Company (NatPharm)
- **Funder:**
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    Tel: +263-4-252-400, email: phalpert@usaid.gov

  Project
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    Tel: +263-4-309-829, email: dalt@zol.co.zw

Delivery Team Topping Up System

About the Delivery Team Top Up

In Zimbabwe, the USAID | DELIVER PROJECT and the Supply Chain Management System (SCMS) project support the Delivery Team Topping Up (DTTU) system, a logistics system which manages condoms, contraceptives, and HIV commodities such as test kits and antiretroviral medicines for the prevention of mother to child transmission. In the DTTU system, facility staff does not place orders; rather, every facility is visited once per quarter by a delivery truck, which acts as a rolling warehouse.

On the truck is a delivery team leader, who works with facility staff to collect basic logistics data, including physical inventories, any days out-of-stock, and any losses or adjustments. This data is entered into customized software called the AutoDRV (Automatic Deliver/Receipt Voucher), which is loaded on a laptop. The software calculates resupply quantities, and facilities are "topped up," or re-supplied, to their maximum level. Upon return from a delivery, data from the laptops are synched to the TOP Up software at the central level. The TOP Up software generates national-level stock status and other program management data. These reports are shared with stakeholders electronically and in hard copy at regularly scheduled coordination meetings. The automation of data collection from service delivery points began in 2008, and was rolled out nationally in 2009.

Evaluation and Results

The DTTU system reduces the burden on healthcare providers, ensures reliable data is speedily available at any time it's needed at the central level, and minimizes stock-outs. An evaluation in 2008 showed remarkable results. Focusing on condoms for HIV and AIDS prevention and contraceptives, the evaluation found that throughout the nation, the DTTU system has achieved 99 percent of coverage of all service delivery points—more than 1,200 health facilities. On the same national scale, it has achieved more than 95 percent availability of contraceptives and HIV and AIDS condoms. HIV tests and nevirapine, an anti-retroviral drug used to prevent mother-to-child transmission of HIV as well as other uses in HIV and AIDS management, have been added to the DTTU.

A costing study conducted in 2010 compared different logistics systems in Zimbabwe to determine the most cost efficient approach. The study found that for a smaller number of commodities that are intended for primary health care facilities, the DTTU system was shown to be less costly than a pull system.

The AutoDRV and the TOP Up software are also used for the Zimbabwe Informed Push (ZIP) and Primary Health Care Package (PHCP) system, which is managed by the Ministry of Health and Child Welfare Directorate of Pharmacy Services (MOHCW DPS). The ZIP/PHCP teams have expanded and in early 2010 the team started a national round of deliveries of essential medicines, including malaria and tuberculosis medicines, and medical supplies included in the Primary Health Care Packages to all ten provinces across the country. The success of the DTTU and ZIP/PHCP commodity distribution systems is progressively advancing.

Lessons Learned

- In a vendor managed inventory system such as DTTU, shifting inventory tasks away from facility staff to a delivery team has enabled facility staff to have more time to spend with clients rather than completing logistics responsibilities.
- The costing study found that DTTU was actually cheaper to implement than the traditional pull system. Only team leaders (65 people) require training, rather than facility staff (~1,300 people).
- Automating data collection has significantly reduced the calculation errors that Team Leaders make, and has reduced the amount of time that must be spent at each facility.
- Data collected from the facility level is automatically migrated into the national level database. No data entry is required, and national level consumption and stock-on-hand data rapidly available for decision-making.

Conclusion

The DTTU system yields positive results in increasing the availability of health commodities in challenging environments by guaranteeing direct delivery to health facilities.

Information was excerpted from:
Video: Information Highway to Health:
http://deliver.jsi.com/dhome/search/searchdetail?p_item_id=26503029&p_token=17F12A1574567BF850E251BDA6244126&p_item_title=New%20Video%3A%20Information%20Highway%20to%20Health
Article in *Pharmalink* on using technology in supply chain management:
http://www.epnetwork.org/index.php?option=com_docman&task=doc_download&gid=295&Itemid=15
Success story on DTTU: http://deliver.jsi.com/dlvr_content/resources/allpubs/logisticsbriefs/ZW_DTTUBrin.pdf

Photo: JSI, USAID | DELIVER PROJECT. The delivery Team Leader records a clinic's inventory, indicated on a carbon copy report, into a laptop as part of the Delivery Team Topping Up system in Zimbabwe, 2011.

Integrated Logistic System - ILSGateway

Brief Overview

Health programs succeed when the supply chain delivers a reliable, continuous supply of essential commodities to clients, so they can choose, obtain, and use these products when and where they are needed. The USAID | DELIVER PROJECT, a U.S. Agency for International Development (USAID) funded project, improves essential health commodity supply chains by strengthening logistics management information systems, streamlining distribution systems, identifying financial resources for procurements and supply chain operations, and enhancing quantification and procurement planning

Implemented by John Snow, Inc., the project designs, develops, strengthens, and, upon request, operates safe, sustainable, and reliable supply systems that provide a range of affordable, quality essential health commodities, including drugs, diagnostics, and supplies, to clients in country programs. The project's technical support strengthens all aspects of in-country supply chains, including quantification, procurement, distribution, management information systems, quality assurance, storage and infrastructure, and medical waste disposal.

- **Geographic Coverage:**
  Tanzania
- **Implementation Partners:**
  Tanzania Ministry of Health and Social Welfare | John Snow, Inc. | Dimagi
- **Funder:**
  USAID, under the USAID | DELIVER PROJECT
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Integrated Logistic System - ILSGateway

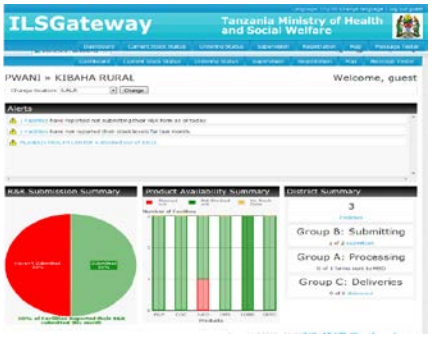
About the ILSGateway

The USAID | DELIVER PROJECT has worked with the Tanzanian Ministry of Health and Social Welfare (MOHSW) to establish the ILSGateway, a mobile logistics system that supports the Integrated Logistics System (ILS). In Tanzania, obtaining high quality logistics data has been a challenge for the health care system. Without this data, decision makers have difficulty managing the supply chain, leading to the possibility that patients won't receive the medicines they need. Before 2005, the health care system in Tanzania was made up of a number of parallel systems for restocking health care facilities with the supplies needed. The growing number of systems was uncoordinated; each cluster of facilities had separate procedures for ordering supplies from the Medical Stores Department (MSD). However, the successful implementation of an integrated logistics system (ILS) by the MOHSW, with technical support from the USAID | DELIVER PROJECT, addressed the duplicative processes by integrating them into one system with a single set of procedures. In 2010, the USAID | DELIVER PROJECT designed the ILSGateway, a mobile system to be used at the lowest level health facilities as a means of enhancing information visibility of key logistics data from the ILS. This new system allows real-time visibility into existing stock levels of crucial medicines.

Created to enhance supply chain decision-making, the ILSGateway is a mobile health alert and reporting system designed to increase the visibility of logistics data and improve product availability. The system was developed with an eye on sustainability, requiring health facility personnel to use personal cell phones to send logistics data via text message (SMS) to a toll-free number. This data is then transmitted to a website that analyzes and displays the information.

Results/Evaluation

The project conducted a quantitative review in addition to a qualitative review that was attended by users from the facility, district, and central levels to evaluate system functionality, usability, and impact. Of the 29 facility users that responded to the survey, 93 percent felt that ILSGateway improved their diligence in conducting a stock count on time. In addition to that, 93 percent indicated they are more likely to submit their ILS report and requisition forms to the district on time as a result of the alerts provided by the ILSGateway. Eighty-eight percent of 17 district respondents said the tool has increased attention to the management of a list of 20 essential medicines, including reproductive health commodities, in their districts. A majority of the district users surveyed (94 percent) responded that ILSGateway has improved the timeliness with which they receive report and requisition forms. Overall, 45 percent of facilities indicated an increase in tracer product availability through the use of ILSGateway.



In the post-pilot phase, the USAID | DELIVER PROJECT and the MOHSW are working to instill a data culture and build requisite computer skills among health workers, particularly at the district level to improve their ability to access data generated in the ILSGateway. Moving forward, the project and partners hope to link this mobile health logistics system to other automated health systems being developed by the MOHSW with the USAID | DELIVER PROJECT and its partners. As the visibility of logistics data improves, decision makers and health workers at all levels will be able to improve the availability of health commodities in Tanzania.

Conclusion

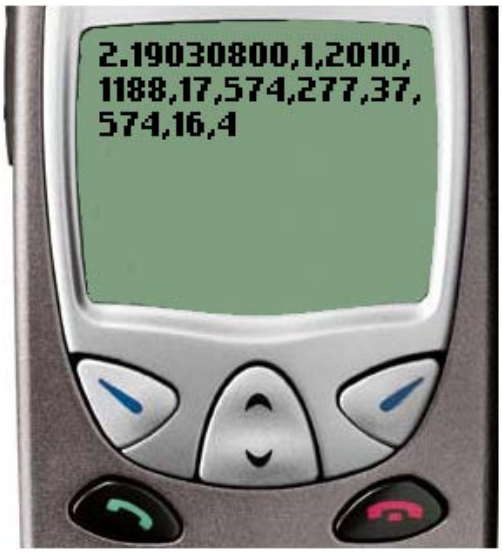
Using mobile phones, the ILSGateway improves the flow of information from facilities to central medical stores, thereby facilitating more timely decision-making and ultimately improved product availability at service delivery points.

Information was excerpted from:

USAID | DELIVER PROJECT, Task Order 4: http://www.jsi.com/JSIInternet/IntlHealth/project/display.cfm?ctid=na&cid=na&tid=40&id=7801
The ILSGateway: Mobile phones improve data visibility and lead to better commodity availability in Tanzania: http://www.jsi.com/JSIInternet/Features/article/display.cfm?thisSection=Features&thisSectionTitle=Features&thisPage=stories&ctid=na&cid=na&tid=20&id=414; AIDSTAR-Two: The Use of Information and Communication Technology in Family Planning, Reproductive Health and Other Health Programs: A Review of Trends and Evidence: http://www.msh.org/resource-center/publications/upload/AIDSTAR-Two_Use-of-ICT-in-FP_Final-Paper_November-7-2011.pdf
Photo Credits: USAID | JSI Deliver Project

International Quality Short Message Services (IQSMS)

Brief Overview



The LEAD project, led by CRS, provides high-quality care and antiretroviral therapy to people living with HIV in four regions of Tanzania. One of the primary objectives is to strengthen the capacity of local partners to provide quality services. In collaboration with 126 government and faith-based Care and Treatment HIV facilities and 787 PMTCT sites, LEAD supports antiretroviral therapy, prevention of mother-to-child transmission and tuberculosis services.

The project aims to increase access to the full continuum of care for PLHIV and their families and envisions a Government of Tanzania healthcare system linking care across community services, healthcare workers, local facilities, and government.

In 2010, AIDSRelief (the predecessor to the LEAD project) introduced International Quality Short Message (IQSMS) to 100 facilities. IQSMS tracks routine aggregate PMTCT indicators using basic SMS mobile phone technology to meet donor and Tanzania Ministry of Health reporting requirements. Reports are submitted monthly to the district and regional levels for program monitoring and decision making.

Geographic Coverage:

Afghanistan, Angola, Bangladesh, Benin, Brazil, Burundi, China, Dominican Republic, DR Congo, Ethiopia, Guatemala, India, Indonesia, Jordan, Kenya, Lesotho, Liberia, Mali, Namibia, Philippines, Rwanda, Senegal, South Africa, South Sudan, Swaziland, **Tanzania**, Ukraine, Vietnam

Implementation Partners:

Catholic Relief Services (CRS) leads a team of partners which includes:
Futures Group International (Futures) | Interchurch Medical Assistance World Health (IMA) | University of Maryland School Of Medicine – Institute of Human Virology

Funder:

CDC

For More Information Contact:

CDC

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Futures Group

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International Quality Short Message Services (IQSMS)

About IQSMS

IQSMS was developed by Futures Group as freely available, open source software, under the creative commons license. This allows IQSMS software to be used by local implementing partners, NGOs and local ICT groups in Tanzania. By taking an open approach to designing ICT solutions, it enables the Ministry of Health and the Government of Tanzania to have country ownership and ensure sustainability of this innovative ICT mhealth solution. IQSMS is an application that uses mobile phone sms to report data in a predetermined format to a centralized server. The SMS is transformed into an integrated database.

The software uses SMS data in a predetermined format, sent to a dedicated central server (can be a basic desktop) connected to a modem or 3G connection. IQSMS records incoming SMS and reports into a SQL database. Automated data quality checks, business rules and immediate notifications are sent to users ensuring that only validated data is added to database. IQSMS was implemented at rural and hard-to-reach sites in areas with network coverage. Messages were received by a modem connected to a server which performed data quality checks and responded to sender. After data verification, the data was automatically integrated into the database. The user was notified about any inaccurate reports rejected by server. PMTCT staff participated in a four-hour training session on using IQSMS. The application is very flexible and reports, data validation and business rules can be updated by an administrator without the need to engage a software developer. The tool can be used for reporting other program areas with no further development.

Results

IQSMS has made reports available on time at the district, regional and national level from facilities. It has reduced the travel frequency of facility staff and field officers since data is sent electronically rather than submitting hard copies. Staff at the district, regional and national level no longer need to aggregate data manually from the facility level and time in error checking has been reduced as the system checks automatically for errors. Wait time on feedback of the quality of reports is significantly reduced. IQSMS has also helped the district and regional offices to be able to compare their reports with other regions for improvement.

By October 2012, 558 sites were sending their reports to a centralized project server in Dar es Salaam. The reports include: PMTCT Antenatal Clinic (ANC) monthly summary form; PMTCT care monthly summary form; PMTCT mother-child follow-up monthly summary form; and labor and delivery monthly summary form. Complaints about the accuracy of the transcription of paper-based reports have been reduced. There is also reduced time in error checking as the system checks automatically and final results are posted within 20-30 seconds.

Lessons Learned

- 558 PMTCT facilities have been reached.
- No paper based reports leading to minimal storage and office space need.
- Reduced travel costs and increased productivity at the facility since monthly travel to deliver reports is no longer required.

IQSMS supports the government to ensure continuity of reports between partners and the Tanzanian Ministry of Health and Social welfare. IQSMS is implemented without any significant investments in data collection labor, transportation and storage costs.

Conclusion

IQSMS is an easy to use and effective tool for aggregate reporting of health and development information. IQSMS reduces the time required to provide feedback to the reporting facilities and can lead to improved efficiencies by reducing travel time to submit reports. The software does not require Smartphones or a specific operating system; a simple feature phone with SMS enabled is the only mobile phone requirement. The system improves data quality and requires to facilities to submit validated reports.

Information was excerpted from:
AIDSRelief Marks Lifesaving Milestones - http://crs.org/united-states/aidsrelief-landmark-event/; http://www.stockholmchallenge.org/project/2010/international-quality-short-message-services; Futures Health Informatics Presentation Bobby Jefferson, Senior Health Informatics Advisor; http://www.iqstrategy.net/frmiqsms.shtml; http://www.stockholmchallenge.org/project/2010/international-quality-short-message-services; Using mobile technology to improve prevention of mother-to-child transmission reporting in Tanzania: T.S. Tulli, J. Ndega, I. Darlene, B. Jefferson, B. Chikira, M. Upendo, E. Robinson, M. Deas, M. Clement, A. Essau, L. Burrows, N. Mwemezi, M. Aidi; 6th IAS Conference on HIV Pathogenesis and Treatment Abstract no. TUPE459; http://www.iasociety.org/Abstracts/A200743546.aspx

Mobile Product Authentication™ (MPA™)

Brief Overview

COURTESY: SPROXIL

The global counterfeit drug market is a serious threat to public health worldwide. Up to 30 percent of medicines sold in developing countries are counterfeit or are substandard. The global counterfeit drug market is estimated to be worth USD $200 billion.

Counterfeit drugs have led to a significant number of deaths globally. According to a 2009 International Policy Network report, over 700,000 deaths have resulted from inauthentic drugs for malaria and tuberculosis alone. Counterfeit drugs have also contributed to increased drug resistance in treating serious global diseases.

Sproxil, Inc. is combating the global counterfeit drug market through a Mobile Product Authentication™ (MPA™) solution that enables consumers to verify the authenticity of pharmaceutical products. Sproxil's MPA solution allows customers to send a free text message containing a code found on a drug to Sproxil's servers, which immediately respond and indicate whether the drug is genuine or fake. In partnership with BIOFEM Pharmaceuticals and Nigeria's National Agency for Food and Drug Administraiton and Control (NAFDAC), Sproxil piloted its mobile verification application between February and May 2010 in Nigeria where the government has been proactive in the fight against fake drugs and there is a strong mobile phone culture.

Since its pilot, Sproxil has expanded rapidly in Nigeria, Ghana, Kenya, and India.

- **Geographic Coverage:**
  Nigeria, Ghana, Kenya, and India
- **Implementation Partners:**
  Sproxil, Inc. developed the application and partnered with a team which included:
  Nigeria National Agency for Food and Drug Administration and Control (NAFDAC) | BIOFEM Pharmaceuticals
- **Funder:**
  BIOFEM Pharmaceuticals
- **For More Information Contact:**
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About MPA

Sproxil has developed a Mobile Product Authentication™ (MPA™) solution that enables consumers to verify that the pharmaceutical product they are buying is genuine. Nigeria-based drug distributor BIOFEM Pharmaceuticals had been searching for a solution to address massive counterfeiting of its flagship Merck Soreno product for Type 2 Diabetes, Glucophage. Sproxil's solution provided the company with a low-cost and efficient way to combat this negative trend.

Consumers use a scratch card, similar to those used to replenish cellular talk-time, to reveal a one-time-use code on pharmaceutical products. They then send the code via SMS to a "911 for fake drugs" number which is identical on all cellular networks within a country. A response is dispatched immediately from Sproxil's servers, indicating whether the drug is real or fake. If a fake product is found, consumers are given a hotline number to call and report it.

Evaluation and Results

During the pilot phase in Nigeria, Sproxil's scratch codes were affixed to over one million sachets of Glucophage. Glucophage sales increased by more than 10 percent in Nigeria and BIOFEM had seen a return on investment of over1,000 percent within 90 days.

As of February 2012, Sproxil had sent more than one million text messages in Nigeria to verify drug authenticity. To further improve access, Sproxil partnered with all global systems for mobile communication (GSM) networks in Nigeria (Etisalat, Glo, MTN, and Zain), with the potential of reaching 67 million users. Consumers can now text on any GSM network in the country using one live short code, 38353. The company has been able to replicate this same service in Kenya through its partnership with Safaricom and the Kenya Pharmacy and Poisons Board (PPB), the national drug regulatory authority.

Lessons Learned

- Partnership building is a major component of Sproxil's success. The company works very closely with multinational mobile phone companies to bundle the price of text messaging for its clients and collaborates with national governments to ensure coordination.
- Care must be taken to secure qualified and reputable manufacturers for scratch labels. The company has introduced a rigorous vetting and screening process to make sure that the suppliers meet quality needs, especially focusing on security and reliability.
- Technology can be used for national tracking of counterfeit drugs. Using MPA™, pharmaceuticals and the appropriate national authorities can track the specific mobile network associated with an incoming text message and identify areas of the country with possible counterfeit activity.

Conclusion

Leading pharmaceutical companies and regulatory organizations in developing countries of Africa and India have been leveraging Sproxil's MPA™ solution to protect consumers from taking potentially harmful counterfeit and substandard drugs since the company launched in 2009.

Since its pilot, Sproxil has been expanding rapidly in Nigeria, Ghana, Kenya, and India. In 2011, Sproxil received US$1.8 million in investment from Acumen Fund, a non-profit impact investment fund. These new funds enabled Sproxil to begin expansion into India and Kenya, build sales teams in Nigeria and the United States, and further enhance the company's technology.

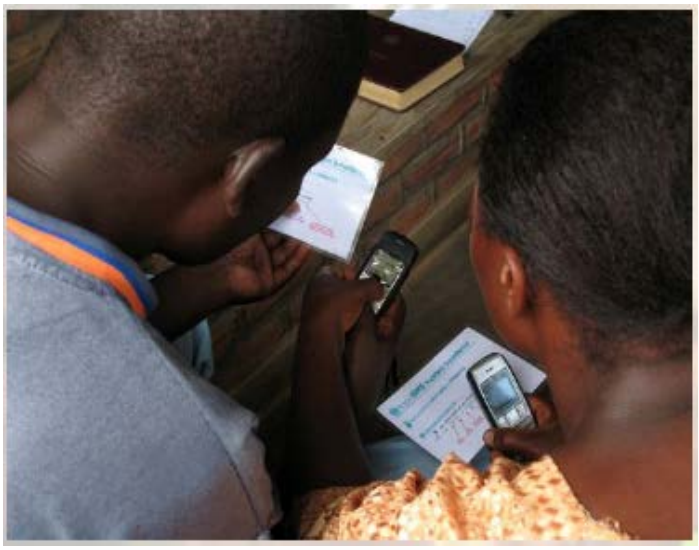
In August 2012, Bharti Airtel ('Airtel'), a global telecommunications company with operations in 17 countries across Africa, announced a partnership with Sproxil to combat the counterfeit drug market in Africa. The partnership is designed to facilitate the deployment of the MPA™ solution throughout developing regions of Africa – markets where Airtel is entrenched as a leading telecommunications provider.

Information was excerpted from:
http://www.acumenfund.org/investment/sproxil.html
http://www.businesscalltoaction.org/wp-content/files_mf/sproxilcasestudy2.23.2012forweb17.pdf
http://www.policynetwork.net/health/publication/keeping-it-real-protecting-worlds-poor-fake-drugs
http://www.reuters.com/article/2010/06/10/us-customs-drugs-idUSTRE65961U20100610

mTrac: Monitoring Essential Medicine Supply

Brief Overview

Challenges in supply chain management of health supplies in Uganda have resulted in regular stock-outs of life-saving medicines in recent years, including artemisinin-combination therapies (ACTs) used for the treatment of malaria and antiretroral (ARV) drugs used for treating HIV and AIDS. In order to to address this, in partnership with the World Health Organization and the UK Department for International Development (DFID), UNICEF Uganda is supporting the Ministry of Health (MOH) in the nationwide roll-out of an SMS-based disease surveillance and medicine tracking system (mTrac) at all 5,000 health facilities and through 8,000 medicine-distributing village health workers.



The main purpose of the mTrac initiative is to strengthen the national Health Management Information System (HMIS) reporting, with an focus on disease surveillance, medicines monitoring, and the generation of community derived reports on health service quality with the aim of empowering government with real-time data, improving health sector accountability, and reducing stock outs. mTrac is built on open-source RapidSMS technology and is designed to work on the mobile phone already in the hands of Ugandan health professionals, with no actual phones being distributed as part of this initiative. mTrac was officially launched in December 2011. mTrac currently has over 15,000 Health Sector Professionals already using the system, with national coverage expected to be achieved by December 2012.

- **Geographic Coverage:**
  Uganda (National)

- **Implementation Partners:**
  UNICEF is working with a team of partners which includes:
  Ugandan Ministry of Health | WHO | UK Department for International Development (DFID) | Foundation for Innovative New Diagnostics (FIND) | Ugandan National Medical Stores (NMS) | Ugandan Medicines and Health Service Delivery Monitoring Unit (MHSDMU) | Malaria Consortium

- **Funder:**
  DFID

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mTrac: Monitoring Essential Medicine Supply

About mTrac

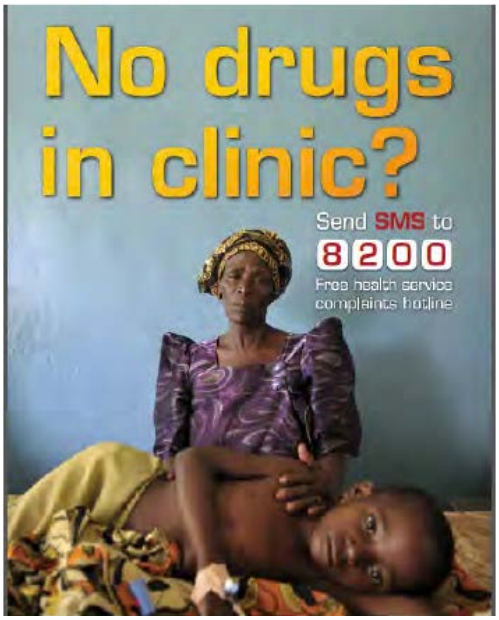
mTRAC is an innovation initiative using SMS to transmit weekly HMIS surveillance reports from the nearly 5,000 Health Facilities in Uganda, tracking disease outbreaks and health facility stock of essential medicines. The data is automatically analyzed by a central server with the data validated and disseminated through a web based dashboard and via SMS alerts, providing the Ministry of Health and district health offices with timely, accurate figures with which to plan and monitor programs. District Health Offices are now using this data to shift medicines from overstocked to under stocked facilities, and lobby the NMS for resupply based on their ability to present reliable and timely data.

The second component of mTrac is an anonymous SMS Service Delivery Complaints toll free hotline through which any community member can report health service-related issues, including health centres closed during working hours and stockouts of essential drugs in hospitals. Currently, more than 10 million mobile subscribers are capable of engaging with the government in the monitoring of health services through mTrac using free SMS messages. It is a service that is rapidly gaining popularity among low-income families that do not have access to computers but own phones.

Evaluation and Results

Through mTrac, the Ministry of Health can now access weekly HMIS data in near real-time. For example, mTrac data is now incorporated into the Ministry of Health's Surveillance Unit's weekly news bulletin and reports of drug stock-outs, and is being integrated into the national DHIS2 database. mTrac recently showed, for example, that 14 percent of reporting facilities had complete stock-outs of ACTs. This information is then forwarded to the NMS and MHSDMU for follow-up and action.

Information coming into m-Trac on reported disease cases is also proving extremely useful for districts to identify problems in service delivery. In January 2012 in Kotido district in northern Uganda, for example, district officials noticed a spike in reported cases of fast breathing (a sign of pneumonia). On investigation, the district health team realized that HCW were misdiagnosing and mistreating pneumonia, and conducted a retraining on the spot.



The mTrac hotline has also proven extremely effective, with complaints ranging from drug theft to rape. UNICEF is working closely with the government to follow up on complaints. Between March and June 2012, 524 high priority cases were investigated and 362 cases successfully resolved. Additionally, community reports from suspected disease outbreaks, such as Ebola, have been forwarded to district health teams for further investigation.

Lessons Learned

- National ownership and full government participation is critical to long term project sustainability.
- Regular monitoring and contingency plans must be made for mobile network failures, which were far more frequent than anticipated.

Conclusion

The availability of timely, accurate and complete health information is critical for the planning, accounting, monitoring and evaluation of activities and interventions for the health sector. mTrac is an affordable and sustainable solution that is helping the Ugandan Ministry of Health to improve services, prevent stock-outs, and be held accountable to Ugandan citizens. Using open-source, RapidSMS technology that is utilized by mHealth initiatives in approximately 15 other African countries, mTrac is highly scalable and replicable.

Information was excerpted from:
http://www.unicef.org/uganda/9903.html
http://healthland.time.com/2012/08/15/disease-cant-hide/#ixzz24rLCEFYd
http://www.unicef.org/uganda/MoRES_Uganda_-_results_and_lessons_learned_July_30th_2012(1).pdf
http://www.finddiagnostics.org/export/sites/default/media/news/pdf/sms-uganda/mTrac_report-9dec2011.pdf

Tupange SMS Commodity Tracking System

Brief Overview

Family planning (FP) commodity security is an integral part of successful FP service delivery. Timely and constant availability of the entire range of FP methods in health facilities is essential in increasing family planning uptake and, in turn, improving use of FP and decreasing unmet need. Perennial stock-outs of FP commodities at facility level have been identified as one of the key factors that hampers effective service delivery.

In order to address these challenges, in collaboration with the Ministry of Public Health and Sanitation and the Kenya Medical Supply Agency (KEMSA), the Kenya Urban Reproductive Health Initiative, locally known as *Tupange*, developed and rolled out the Informed Push Model (IPM) for FP commodity distribution. Tupange is funded by the Bill and Melinda Gates Foundation and implemented by a consortium of five agencies, led by Jhpiego, in partnership with Marie Stopes Kenya, Pharm Access Africa Ltd, The National Council for Population and Development, and the Johns Hopkins Center for Communication Programs.

The IPM is a distribution model that relies on timely and good quality information to make resupply decisions. The data is provided through the Tupange SMS Commodity Tracking System (TSCTS), which uses mobile technology to transmit FP commodity stock status data to a web based platform. The data is then analyzed and feeds into the IPM to inform re-supply or re-distribution to facilities. The TSCTS is implemented in three project urban sites: Mombasa, Kisumu, and Nairobi. The program was awarded in 2009 and runs up to 2014.

- **Geographic Coverage:**
  Kenya
- **Implementation Partners:**
  Jhpiego leads a team of partners which includes: Marie Stopes Kenya | Pharm Access Africa Ltd | The National Council for Population and Development |the Johns Hopkins Center for Communication Programs
- **Funder:**
  Bill and Melinda Gates Foundation
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Tupange SMS Commodity Tracking System (TSCTS)

About TSCTS

To ensure a consistent supply of family planning commodities and reduce stock-outs, Tupange introduced a web-based commodity tracking system which uses short text messages (SMS) to monitor commodity levels in Tupange-supported facilities, and to ensure that stock-outs are reported in time by facilities to ensure rapid restocking. The staff at health facilities are offered pre-paid phone credit and then use their personal mobile phones to send coded text messages in a specific sequence and format to the centrally automated system to report stock-outs. They immediately get a response, which created a sense of ownership of the system.

The SMS reports are used to quickly determine stock-out situations and the interventions needed, much faster than the manual system in which reporting forms are filled on a monthly basis. Reports on the new system are filtered to a web interface where users with can easily access and download data using a password. With almost instant reception of reports, the system has enabled quick and efficient response to FP commodity stock-outs; nearly all facilities on the system report promptly and on time whenever commodities run low.

A facility manager authorization is required in order for staff to report a commodity shortage. Additional commodities are supplied based on the report received. Physical inventory checks are done, and end user support is given.

Evaluation and Results

The technology has now been scaled up in Nairobi, Mombasa and Kisumu. As of December 2011, a total of 99 facilities were using the mHealth application. Improvements have been noted in reporting accuracy, indicated by a decrease in errors and unformatted messages being received. Some of the key results include:

- Real–time reports allow faster and informed decision making;
- Increased FP uptake due to availability of range of commodities;

- The system is user friendly, so the concept was easy to understand;
- Improved reporting rates have led to improved quantification, forecasting and redistribution/ distribution thereby minimizing stock-outs;
- Increased reporting rates for stock levels in all Tupange supported facilities (currently at about 80 percent); and
- Timely reports allow staff time to react to potential stock-outs or overstock situations.

Lessons Learned

- Facility staff were overwhelmed with manual paper based reporting tools. An SMS report was easily embraced as it was seen as an efficient & time saving method for reporting data using current technology.
- The health staff rotations at the records office (in health facilities) were short and this left a challenge of data ownership and data quality in handing over. This was solved by increasing rotation period of staff shifts that improved data quality and made data more useful for decision making by the health facilities.

Conclusion

Overall, TSTCS provides a very good platform for monitoring and reporting stock-out of commodities to meet health population needs.

Information was excerpted from:
Tupange Newsletter, January 2012, Volume 1 Issue 2; www.tupange.or.ke;
PowerPoint presentation at http://www.slideshare.net/lenoyuga/tupange-sms-tracking-system-quick-pictorial-on-impact/download

CommCare for Home-Based Care

Brief Overview

Home-based care providers (HCBPs) are community health workers that play a vital role in serving poor and hard-to-reach populations suffering from chronic diseases. They promote preventive care and convey important health information during regular visits to a patient's home. Being embedded in the community and experiencing the reality of a patient's daily life, the CHWs are in a unique position to understand the challenges facing patients. CHWs also have the potential to collect information that is needed at the national level about disease burden and barriers to adopting preventative health practices.

CommCare, a software application that runs on mobile phones, was developed and scaled up by D-tree International in order to improve the effectiveness of Pathfinder International's home-based care (HBC) programs in Tanzania. The tool assists HBCPs to screen for common problems, manage household visits and referrals for services, collect data, and report on program activities and outcomes. Additionally, supervisory, as well as monitoring and evaluation (M&E) components of the program, help supervisors better manage their providers and programs in the field.

The project start date was October 2008. There are currently over 300 HBPCs using CommCare who are trained and monitored by Pathfinder International, D-tree International and district municipal staff in Tanzania. HBPCs using CommCare are located in two districts in Dar es Salaam.

- **Geographic Coverage:**
  Two districts of Dar es Salaam, Tanzania
- **Implementation Partners:**
  Pathfinder International is leading a team of partners which includes:
  D-tree International | National AIDS Control Program (Tanzania) | Temeke and Kinondoni District Councils
- **Funder:**
  The Centers for Disease Control and Prevention (CDC)
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  D-tree
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CommCare for Home-Based Care

About CommCare

The phone-based tool simplifies the collection and transfer of data to a general database and offers decision-making support to HBCPs. The application applies the guidelines for care and data collection that HBCPs are trained to follow and is used to support the delivery and management of community health services including:

- HBC for people living with HIV/AIDS;
- Home-based counseling and testing (HBCT);
- TB screening at the community level; and
- Family Planning counseling using the Balanced Counseling Strategy Plus approach (BCS+).

The application provides a checklist of activities which are expected to be performed during each home visit, as well as reminders of appointments. It gives HBCPs access to electronic registration forms for new clients, follow–up forms for existing clients, referral options for existing clients, and reminder options for pending referrals and visits to clients. It also provides HBCPs with a list of appropriate steps for counseling clients and basic information on the benefits, potential side effects, and efficacy of family planning methods. The tool runs off-line as a stand-alone application on the HBCPs java-enabled phone.

The HBCPs send their data to the server on a daily basis using general packet radio service (GPRS), a packet oriented mobile data service, and from there, supervisors can view activities by HBCP and monthly government and supervisory reports. An additional feature of the system is an SMS reminder that is sent to each HBCP and their supervisors notifying them of upcoming or missed follow-up visits.

Evaluation and Results

Five HBCPs in the Kibada area of Dar es Salaam were trained to use the application in November 2008. Qualitative interviews were conducted with seven clients whom had been visited by HBCPs during this initial period, and overall, the clients spoke positively of the phone-based system. The phones were seen by clients as better for privacy than paper records, given that they are more discreet than paper notebooks and cannot be read as easily by third parties. They also saw the phone-based system as advantageous because records are not as vulnerable to destruction.

Project staff have noted additional improvements to both the management and delivery of services.

- Improved reporting time from old paper system collection and data entry (weeks/months) to instant (100 percent availability on web-based dashboard for supervisor).
- Use of SMS reminders to the HBCPs and their supervisors resulted in an 86 percent reduction in the days overdue for client visits (9.7 to 1.4 days).
- Anytime visibility into the activity levels of 300 users now possible, which enables remote monitoring and follow up.

Lessons Learned

- Simplicity of the mobile application is critical for quick and easy use.
- It is important to limit the number of SMS messages a single user receives as they can easily become overwhelmed.
- SMS reminders for the HBCPs alone are not nearly as effective as when supplemented by calls from supervisors.
- It is important to plan as early as possible with the government and partners when transitioning from paper reporting to electronic reporting in order to reduce any double reporting.
- Use of local champions or "superusers" can greatly improve field support capabilities.

Conclusion

This project has demonstrated how successfully mHealth tools can be used to improve the delivery of HBC and has shown the utility of mobile applications in improving data collection, monitoring, and reporting. Although there is no concrete health outcome data at this point, one can assume that the clients of these HBCPs are healthier than they would have been otherwise in a system where HBCPs would not complete all of the required visits, referrals, counseling, or checks for health issues.

Information was excerpted from:
http://www.commcarehq.org/users/commcare-tanzania/
http://www.w3.org/2008/10/MW4D_WS/papers/dtree.pdf

Community IMCI (cIMCI)

Brief Overview

Malawi is home to 6.8 million children. Infant and child mortality rates are high due in part to widespread poverty, lack of access to sanitation, food insecurity, and preventable diseases. While the prospects for child survival have improved over the past few years, one in eight children are still dying, mostly of preventable causes such as neonatal conditions, pneumonia, diarrhoea, malaria, and HIV-related diseases. Malnutrition levels remain high and underly over half of all child deaths.

D-tree International is a technical assistance partner in the USAID-funded "Integrated (HIV Effect) Mitigation and Positive Action for Community Transformation" (IMPACT) project, which is designed to improve the quality of life of orphans and vulnerable children (OVC) in targeted districts of Malawi. D-tree designed a mobile phone-based application that is being used by 50 health surveillance assistants (HSAs) in three districts in Malawi. The application assists the HSAs in accurately treating children aged two to 59 months who are sick and supports them to follow the community integrated management of childhood illness (IMCI) protocol provided by the Ministry of Health's IMCI unit. The tool was modeled on the government of Malawi's community case management (CCM) protocol, which was developed to ensure that the front lines of the health system have the tools they need to reduce the common causes of childhood morbidity and mortality.

The IMPACT project is being implemented from June 2010 to June 2014, and the last cIMCI mobile application training was completed in August 2012. Over 4,000 children have been assisted with the use of the CCM mobile application through the IMPACT project.

- **Geographic Coverage:**
  Three districts in Malawi
- **Implementation Partners:**
  D-tree International | Malawi Ministry of Health, Integrated Management of Childhood Illness Unit
- **Funder:**
  USAID/Malawi
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  - **Dr. Marc Mitchell, President;**
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About Community IMCI (cIMCI)

The stand-alone application runs on a java-enabled phone that HSAs use offline. HSAs are guided step by step through the process of registering sick children, listening to their complaints, performing an examination, delivering diagnosis, and administering treatment. The tool follows the Ministry of Health (MoH) guidelines exactly and makes it difficult for HSAs to make mistakes such as missing danger signs or examination points, or prescribing the wrong or incorrect quantities of medicine. The application also supports HSAs to refer children who are in need of more advanced care to a health facility and allows the HSA to follow up with the child after referral. The current CCM protocol used by HSAs primarily focuses on four conditions: fever, cough, diarrhea, and acute malnutrition.

On a daily or weekly basis, HSAs send their completed data to a server using general packet radio service (GPRS), a packet oriented mobile data service which is many times less costly than SMS, for backup and reporting purposes. Data and reports are then available for supervisors from the website at any time, rather than having to wait for the paper forms to be submitted and tabulated.

Evaluation and Results

To analyze the effect of the mobile application, D-tree compared data from a village clinic register for a five month period before the introduction of the mobile application with data the HSA sent through the mobile application for the same five month period a year later. The comparison revealed that the use of the mobile application increased the number of referrals from five percent to 11 percent. These findings affirm those of other studies which indicate that danger signs are often overlooked. This further suggests that the HSAs are now more fully examining the children and referring where necessary.

The findings also show that follow up has increased substantially since the introduction of the mobile application. No follow up information was entered in the paper register whereas 26 percent of visits were actively followed up, according to mobile data.

At the beginning of the project, some caregivers were skeptical about the use of the phone at the village clinic. However, anecdotal data suggest that they came to appreciate the tool once they experienced the improved thoroughness of examinations. One of the HSAs reports hearing one caregiver tell another, *"You were lucky, because your child was assessed with the phone today."*

A planned evaluation in 2013 will compare performance on the following indicators by the mobile phone-based system vs. paper-based:

- Protocol adherence;
- Correct diagnosis and treatment;
- Appropriate referrals;
- Data quality; and
- Attitudes of HSAs and their patients (or caretakers of children) towards the use of phone-based protocols at the village clinic.

Lessons Learned

- Input from MoH is important to ensure the application is compliant with government guidelines.
- Replacing a paper-based system with a mobile application influences the reporting and supervisory structures. This calls for careful consideration of appropriate alternatives.
- It is important to research phone suppliers, whether local or US-based, in order to avoid procuring non-genuine or defective phones.
- Establishing local champions or "super-users" in each area is critical so that they can provide basic troubleshooting support to other HSAs. This is especially important as the project scales up.
- The main reason users failed to submit data is due to either a lack of medicine at their village clinic or competing activities that prevented them from operating the clinic.

Conclusion

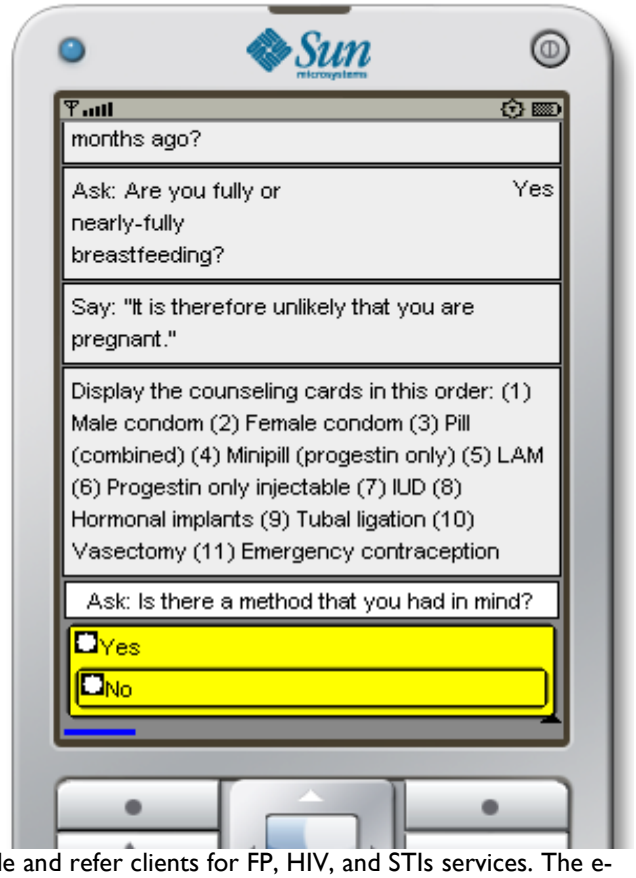
cIMCI can be effectively programmed and deployed on an easy to use mobile device to support HSAs working in hard to reach areas. The HSAs using this application adhere more effectively to protocols, perform better at identifying very sick children and referring them to health facilities, and are more likely to follow-up with the sickest clients.

Information was excerpted from:
http://www.unicef.org/malawi/children.html
https://groups.google.com/forum/?fromgroups=#!topic/ict4chw/uVMANnkDSeg

eFamily Planning (e-FP)

Brief Overview

Family planning saves lives, improves the health of both mother and child, strengthen communities, and stimulates economic growth. Despite the evidence, a quarter of Tanzanian women have an unmet need for family planning services, and only 27 percent reported using a modern contraceptive method in 2010. Community-based Family Planning is a fundamental approach to increase access to Family Planning services. In order to strengthen community-based family planning services, D-tree, in collaboration with FHI 360 and Pathfinder International, developed and is implementing an open-source mobile phone-based family planning application. The electronic family planning (e-FP) application is expected to improve counseling on FP, and hence increase access to and the uptake of family planning methods. The e-FP job aid is a new module for the home-based care (HBC) system that is currently being scaled up by community health workers (CHWs) in Dar es Salaam, Tanzania.



The tool provides each CHW with an algorithm to enable the CHW to effectively counsel, screen, provide and refer clients for FP, HIV, and STIs services. The e-FP application also allows for the collection and reporting of data that will help to monitor and evaluate the program.The project runs from February 2011 to March 2013 and is currently being used by 20-30 CHWs in Dar es Salaam, Tanzania.

- **Geographic Coverage:**
  Dar es Salaam, Tanzania

- **Implementation Partners:**
  FHI 360, under the PROGRESS Project, is leading a team of partners which includes:
  D-tree International | Pathfinder International | Tanzania Ministry of Health RCHS Unit

- **Funder:**
  USAID

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  D-tree
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eFamily Planning (e-FP)

About e-FP

D-tree, in partnership with FHI 360, Pathfinder, and the Ministry of Health, has developed the e-FP job aid based on a combination of proven evidence-based tools including the balanced counseling strategy plus (BCS), the pregnancy checklist, the provider screening checklist for oral contraceptives, and the decision-making toolkit. The development of this application therefore builds on what has already been developed and will continually be tested and further refined.

The BCS is a family planning counseling framework developed and refined over a number of years by the Population Council. It was originally developed for use in a clinical setting rather than by community health workers. The heart of the BCS is an 11-step algorithm which choreographs a specific dialogue between provider and client, and which is supported by two kinds of materials for each method: a counseling card and a brochure.

The provider screening checklists help providers determine if a woman is medically eligible to initiate use of any of four popular contraceptive methods: combined oral contraceptives (COCs), injectables (DMPA and NET-EN), the copper intrauterine device (IUD), and implants. A fifth checklist helps to rule out pregnancy among non-menstruating women.

The Decision Making Toolkit includes a decision-making aid for clients, a job-aid and reference manual for providers, and a training resource. Its format allows easy interaction with clients – one page faces the client (with simple information on key issues for the client to consider) and a corresponding page faces the provider (with key points and detailed reference information). Health-care providers can use it step-by-step to help clients make informed choices that suit their needs.

The e-FP application consists of an algorithm (the e-FP job aid) and an SMS-based management tool. The application also supports the following:

- registration of clients;
- collection of follow-up data on clients; and
- monitoring of referral status.

It guides the CHWs to effectively counsel, screen, provide and refer clients for FP, HIV, and STIs services.

Evaluation and Results

Evaluation of this project, planned for 2013, will examine the acceptability and feasibility of the mobile job aid using a randomized control design, and will compare quality of FP service provision, including screening and referrals, and efficiency of data reporting, to a paper-based tool. Six health facilities in the Dar es Salaam region of Tanzania were randomized to use either the mobile phone-based application (intervention group) or paper-based tools (control group). The post-test only control group design includes structured surveys with clients, in-depth interviews with CHWs and their supervisors, data abstraction from client records, field reports, and cost-effectiveness analysis.

Lessons Learned

- Close partnership with the government is essential for effective program implementation.

Conclusion

Although it is too early to assess the results of the program, the team anticipates seeing positive impacts from the implementation of the program as far as quality of the family planning counseling given and in the efficiency of managing the program, due to the improved timeliness of data.

Information was excerpted from:
http://healthmarketinnovations.org/program/d-tree-international-0
http://d-tree.org/wp-content/uploads/2010/05/Yaounde-March-2010-Family-Planning1.pdf
http://www.fhi360.org/en/Research/Projects/Progress/GTL/mobile_tech.htm

eNutrition

Brief Overview

Malnutrition is a disease that threatens the lives of children worldwide. It is especially serious in Zanzibar, where nearly 12 percent of children have acute malnutrition. While acute malnutrition is an entirely treatable condition, 2009 data available from sites in Zanzibar showed that between 20 to 30 percent of children who were admitted with severe acute malnutrition (SAM) died, despite receiving treatment. If children with SAM are treated according to the WHO/UNICEF standard treatment recommendations, case fatality rates can be reduced to as low as five percent.

In 2010, the Zanzibar Ministry of Health and Social Welfare (MOHSW) developed guidelines for outpatient therapeutic care (OTC) and rolled it out to all health facilities. However, implementation has been challenging as the guidelines are relatively complex and depend on access to information about a child's past weight, past treatment, and guideline targets. This information is only available when a variety of records are referenced for each visit. Typically, the records are either missing or difficult to interpret.

In response to this, D-tree International developed a mobile decision support tool for nurses providing OTC for children with SAM in Zanzibar. The pilot program is currently being implemented in 12 health centers in two districts and will scale up to cover 50 sites covering all districts in Zanzibar. The program implementation period is from July 2010 to December 2013.

- **Geographic Coverage:**
  Zanzibar, Tanzania

- **Implementation Partners:**
  D-tree International, with funding from the Government of Norway through the mHealth Alliance's Innovation Working Group's Catalytic mHealth Grants Program under the UN Secretary-General's *Every Woman Every Child,* is leading a team of partners which include:
  Ministry of Health Zanzibar Nutrition Unit | Etisalat | Zantel

- **Funder:**
  UNICEF's Innovation Working Group and Norad through the mHealth Alliance

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  D-tree
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    Tel: +1-617-432- 6322; email: mmitchel@hsph.harvard.edu

About eNutrition

In order to make acccess to records and protocols easier for nurses, D-tree developed a mobile phone-based tool that provides relevant information in a format that is easily followed and monitored. The tool replicates the MOH's guidelines for provision of care to children with SAM. The software runs on the Android operating system and combines on-device electronic medical records with detailed instructions for patient visits and a platform for recording information. The application protects data via a login procedure requiring a username and password.

The tool partitions the national guidelines into several electronic protocols which all have access to and contribute to the patient's record. It allows for the screening and registration of each child with malnutrition. For each visit of the enrolled child, the nurse is prompted to conduct and log the following actions:

- Screening for status (weighing, etc.);
- Appetite test, as prescribed by the guidelines;
- Physical examination (e.g. to check for complications);
- Treatment (e.g., provision of correct amounts of ready-to-use therapeutic foods);
- Counseling of the caregiver; and
- Setting next appointment.

Entered data is then sent to a server using general packet radio service (GPRS), a packet oriented mobile data service, for backup, storage, and reporting. From the server, the MOH, District Health Management Team (DHMT), and supervisors can view the required government reports in a graphical format.

Evaluation and Results

With regard to the feasibility of this solution, the program has demonstrated the following:

- Nurses have little problem in learning to use the software and the device;
- Network coverage and speeds permit nurses to synchronize their patient records with a central server located in Dar es Salaam, and nurses easily learn how to do this; and
- Nurses are able to take responsibility for recharging the phone batteries.

Early evaluation also reveals that caretakers accept the use of phones in the provision of care, and nurses are enthusiastic about the intervention, reporting that the application:

- Makes their job easier;
- Makes it easier to follow national guidelines;
- Simplifies the interactions with clients; and
- Is easy to use.

The use of electronic protocols and records can lead to better adherence by nurses to national guidelines. This is especially true for those aspects of the protocols demanding arithmetic calculations, such as the amount of food supplement to provide. For the comparison of adherence between paper and electronic protocols, client data from between December 2010 and March 2011 were selected and checked for errors in calculation of the amount of ready-to-use therapeutic foods provided (based on body weight), calculation of target weight (based on enrollment weight), and to see if clients were being discharged in accordance with the national guidelines (showing 15 percent weight gain and no complications). In each case, the error rates dropped from as high as 45 percent to zero percent within the first three months of using the phone-based tool. Additionally, there were significant increases in cure rates (over 33 percent improvement) comparing before and after the phone-based program was implemented.

Lessons Learned

- When replicating this program, one should anticipate frequent staff turnover in program planning, train all potential users, and be prepared to train new users due to frequent transfers among nurses.
- An effective facility based intervention such as OTC treatment of SAM will benefit from a concerted community component for the screening and follow-up of defaulters.

Conclusion

This project has demonstrated that nurses can use decision support tools at the point of care to more effectively treat children with SAM. Additionally, supervisors can more effectively monitor and report on the status of program implementation using a mobile-enabled system.

Information was excerpted from:
http://www.d-tree.org/wp-content/uploads/2010/08/D-tree-Excerpt-Innovation-Report-Sept-2011.pdf
http://www.d-tree.org/our-approach/press/
http://www.gsma.com/mobilefordevelopment/treating-malnutrition-in-zanzibar-empowering-health-workers-with-an-mhealth-solution/

Maternal Health (Antenatal and Postnatal Care)

Brief Overview

In Tanzania, almost 80 percent of the population lives in rural areas, often far from well-equipped health facilities with trained personnel. This has contributed to one of the highest maternal mortality ratios in the world, with about 454 maternal deaths per 100,000 live births.

In order to improve the quality of care for pregnant women during the antenatal and postnatal period, D-tree International, with support from Jphiego's USAID-funded Mothers and Infants, Safe, Healthy, and Alive (MAISHA) project, has developed a mobile phone-based tool for service providers to use with pregnant clients. The application follows national and international guidelines of care, providing service providers with checklists and electronic data entry platforms. Improved adherence to national and international guidelines of care has been demonstrated to have a positive health impact on mothers and their children. Hence, this project aims to improve adherence, and consequently, health outcomes.

The project is currently being implemented by service providers in two health facilities in the Morogoro region of Tanzania. Implementation of using mobile phones for health began in 2011, with a pilot phase in some health centers of Morogoro . The second phase of the project will begin in November-December 2012 and will include a mobile phone application for community health workers to use.. The project is expected to continue under MAISHA.

- **Geographic Coverage:**
  Morogoro, Tanzania
- **Implementation Partners:**
  Jhpiego is a lead partner, collaborating with:
  D-tree International | Tanzania Ministry of Health Reproductive and Child Health Section
- **Funder:**
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Maternal Health (Antenatal and Postnatal Care)

About Maternal Health (Antenatal and Postnatal Care) Project

The application, used by service providers as they attend pregnant women, includes an electronic registration form and checklists to ensure that all services such as checking for blood pressure and screening for other danger signs are done according to standard. Screening protocols also include monitoring for fetal growth and maternal health. All of the care that is provided is based on the obstetric and medical history of the woman and the gestation age. After seeing the client through the antenatal period, the nurse records the delivery outcome, and the client is transferred to the postnatal care portion of the application. From there, all of her previous visits are still available for viewing, and she is then seen through postnatal visits, following the checks for danger signs, counseling, physical examinations and treatments recommended in the national guidelines. The application supports the providers in their daily attendance of clients, as well as referrals if needed. It facilitates the tracking of clients through indicators showing each client's expected clinic visit dates and identifies those who are overdue for their next appointment.

The application runs offline on phones and synchronizes with the server using general packet radio service (GPRS), a packet oriented mobile data service, for back up, reporting and analysis. From the server, supervisors can monitor the activity levels of individual health facilities and nurses, as well as identify trends in care such as referral rates, average number of antenatal care (ANC) and postnatal care (PNC) visits, etc. The data required to generate government reports for antenatal care are currently available and the postnatal reports will be available in the coming months.

The next phase of the project will include an application for community health workers (CHWs) to use. This application will guide CHWs through registration, checking for danger signs, educating, and making referrals for women during the pre and post-partum periods. This will complement the application run by service providers in health facilities by supporting high-quality care for women both in facilities and in the community.

Evaluation and Results

There has been a very positive response from health workers using the application. Service providers have reported that the application helps in calculation of expected date of delivery (EDD) based on last normal menstruation period (LNMP), age, gestation age, and directs them on what to do according to the age of pregnancy. This helps them to provide appropriate, quality care. One user said; *"The application is very good as it looks like a checklist, so instead of opening different books, we just use the phone for everything*". Nurses have quickly been able to integrate this tool into their daily work in in both medium and high volume sites, where they see nearly 400 clients on a monthly basis.

In an earlier implementation of this project in Tanzania, implementing partners observed a marked increase in the number of women in which anemia and high blood pressure was detected. This indicates that the tool helps users to not only perform the necessary checks at each visit, but also to interpret the results correctly.

Lessons Learned

- LNMP is not always known, and thus, it is important to allow any rules-based program such as this to be flexible in allowing service providers to use their judgment to assist in establishing the gestation age.
- In addition to use at the facility level, the service providers were enthusiastic about using the phones during their outreach visits, which has the potential to extend high quality maternal care from the facility to the community level
- Shortage of necessary commodities for treatment and lab tests impacts health worker compliance with guidelines, and we have updated the application to show "not available" to make it clear where the health workers know what needs to be done, but don't have the necessary commodities to do so. We are actively working with the facility in charges and the district to address these issues

Conclusion

The project has shown that the application can be effectively implemented in rural settings and that health workers in reproductive and child health clinics are pleased to be supported with such a tool.

Information was excerpted from:
http://www.jhpiego.org/files/Tanzania%20Country%20Profile.pdf
http://www.voanews.com/content/tanzania-seeks-help-with-high-maternal-mortality-rate/1519187.html

mHealth for Safe Deliveries in Zanzibar

Brief Overview

More than 1,000 women die every day in the developing world as a result of complications in childbirth. High rates of maternal illness and death are found in the Zanzibar archipelago of Tanzania, where half of all births still take place at home, far from skilled care. Post-delivery, only one-third of Zanzibari mothers and newborns receive post-natal check-ups within 42 days after birth, locking them out of opportunities to access post-partum care and infant vaccinations.

With funding from the Bill and Melinda Gates Foundation, D-tree International is focused on preventing maternal deaths by identifying pregnant women who need a higher level of health care and subsequently linking them to local health facilities.

In collaboration with the Zanzibar Ministry of Health and Social Welfare (MOHSW), this D-tree project puts mobile phones with a pregnancy screening and care application in the hands of lay community health workers to assist them in reducing the many barriers to safer child birth services and post-partum care for mothers. These community health workers, called traditional birth attendants (TBAs), screen and refer high risk pregnant women to health facilities.

The project began in November 2011 with the purpose of reducing maternal deaths by providing a safety net for mothers who deliver at home and removing the logistical and financial barriers to safe births and post-partum care for mother and child.

- **Geographic Coverage:**
  Zanzibar, Tanzania
- **Implementation Partners:**
  D-tree International is leading a team of partners which include:
  Etisalat | JHPIEGO | Zanzibar Ministry of Health and Social Welfare
- **Funder:**
  Bill and Melinda Gates Foundation
- **For More Information Contact:**
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  - **Ken Warman;**
    Email: Ken.Warman@gatesfoundation.org

  D-tree
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About mHealth for Safe Deliveries

In accordance with MOHSW care guidelines, D-tree developed a mobile phone-based clinical algorithm that takes TBAs step by step through a screening process to identify pregnant women who are high risk or have any danger signs during pregnancy and labor. These algorithms, running on java-enabled Nokia phones, assist TBAs to: register pregnant women; screen the women for risks; develop birth plans with the women; and encourage the women to deliver at a facility.

For high risk women who need the level of care only offered at a health facility, the mobile phone application is programmed to help the TBAs contact an emergency driver, record the family's permission for emergency transfer, and identify the closest health facility. TBAs call the clinic to alert them that an expectant mother is on the way. Working with Zantel, a local mobile service provider, D-Tree also built mobile banking accounts for each TBA into the system to pay for emergency transport and appointments.

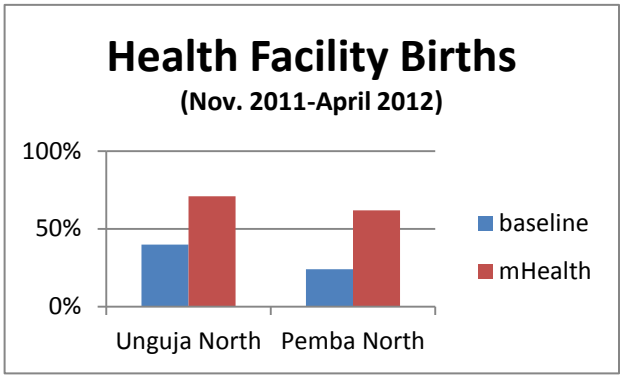
Additional phone-based algorithms assist the same TBAs to screen mother and newborn within two to five days after childbirth to ensure that they get the essential health care services that are so critically needed at this point in their lives.

Evaluations and Results

Traditional birth attendants in two districts of Zanzibar were trained to use the application. During the pilot implementation period of November 2011 to April 2012, TBAs successfully registered 682 pregnant mothers, 211 of which delivered during this period. Of the 211 mothers who delivered, 143 (68 percent) gave birth in health facilities during the pilot compared to only 34 percent prior to the project. In North A, 90 (71.4 percent) of the 126 births occurred in a health facility, and in Micheweni, 53 (62.3 percent) of the 85 births occurred in a health facility.

As of July 2012, a total of 629 registered women have delivered healthy babies since the beginning of the program, and a striking 70 percent of these births have taken place at a health facility.

Comparison of the child births in health facilities before vs. during the pilot



In addition, TBAs reported the following results from the use of the phone based tools: improved general knowledge (31percent); improved knowledge about danger signs (27 percent); and better understanding of the importance of obstetric history (14 percent).

Lessons Learned

- As trusted community members, traditional birth attendants and other community-based health workers are well placed to reach women with essential information.
- Local resources, (in this case, taxis), can effectively be utilized without having to buy new vehicles through strong coordination and communication between TBAs, local leaders, and taxi drivers.

Conclusion

The project provides evidence that women who normally would have delivered at home can be convinced to deliver their babies at health facilities if given adequate information from a trusted resource. A front line health worker in the community can provide excellent counseling and identify danger signs if supported by good tools.

Information was excerpted from:
Mitchell, Marc et al. March 2012. Reducing Maternal Mortality: mHealth for Safer Deliveries in Zanzibar. D-tree International.
http://www.globalgiving.org/projects/safedelivery/
Cell Phone Based Protocols for Safer Childbirth Enable High Risk Pregnant Women to Access Care at Health Facilities. D-tree International.

Mobiles for Quality Improvement (m4QI) – SHOPS Project

Brief Overview

Many developing countries have a severe shortage of health providers, and many of the providers who are working have only limited access to up-to-date clinical protocols, or face-to-face trainings. Mobile phones offer an innovative channel through which to provide cost-effective approaches for clinical training and support for improving quality of care.

SHOPS' partners Abt Associates, Jhpiego, and Marie Stopes International (MSI), collaborated in a mobile learning and performance support pilot called Mobiles for Quality Improvement (m4QI) conducted in Uganda during the period September 2010 – August 2011. The goal of m4QI was to demonstrate the potential for positive behavioral change in service delivery by reinforcing face-to-face induction training lessons provided to Marie Stopes staff. Research supports the theory that spaced reinforcement of training combined with testing can significantly improve long-term knowledge retention and facilitate behavioral change.

The objectives of m4QI were to develop and test a technology-supported approach to performance improvement including processes for identifying performance gaps in adherence to clinical protocols, a platform to manage and automate the delivery and receipt of text message reminders and quizzes to address the gaps, and production of actionable data to improve effectiveness of supportive supervision and follow-up. To support scalability and replicability, the pilot platform was designed for users of low-end phones, and those without Internet access.

Geographic Coverage

Uganda

Implementation Partners:

Abt Associates Inc. leads a team of partners that includes:
Banyan Global | Jhpiego | Marie Stopes International | Monitor Group | O'Hanlon Health Consulting

Funder:

USAID

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Mobiles for Quality Improvement (m4QI) – SHOPS Project

About m4QI

The pilot was conducted with 34 family planning staff working in six geographically dispersed service delivery sites which included three MSU Health Centers and three MSU Outreach Teams that offer family planning services.

A Uganda software development organization, Appfrica, was selected to develop FrontlineSMS: Learn, which allows for the delivery and receipt of text messages of daily instructions, tips, and quizzes to target behaviors related to infection prevention, client care, and adherence to standards and guidelines. Adapted from the FrontlineSMS platform, this open source application is intended to work in environments with low-end phones and no access to internet. The text message software used in the pilot program is freely available from FrontlineSMS: Learn.

The m4QI platform was hosted and managed by staff of MSU's research department, who were responsible for locating a computer, acquiring a modem and SIM card to attach to the computer, downloading and installing the FrontlineSMS: Learn software, entering the participants phone numbers, adding messages and scheduling their delivery, and monitoring the software operation.

Evaluation and Results

A total of 3,449 messages were sent to project participants, with an 86.5 percent success rate of receipt. Post-pilot interviews with participants suggested high acceptability of text messages for performance improvement, with generally positive comments, though some negative feedback included the lack of message clarity and frustration with technical problems.

A total of 251 incoming messages were received from participants in response to questions delivered, with a decrease in response rates observed while modem issues were being resolved at the beginning of the project as well as when participants were notified toward the end that evaluations were beginning, indicating the project would be ending. The average response rate was 19 percent, with wide variation in response rates by location and by cadre, varying from an average of 11 responses per provider at the most active site to an average of 1.3 messages per provider at the least active site.

Through structured interviews conducted at the end of the pilot, providers reported the following:

- **Being motivated** by reminders to adhere to hand-washing rules;
- **Referring to training manuals** when receiving a quiz question about treatment protocols;
- **Re-learning steps** in instrument sterilization they had forgotten; and
- **Using tips** about pain management to more closely attend to clients.

The pilot was also described as promoting team learning and further research on text questions, and increased use of training reference manuals and clinical guideline documents.

Lessons Learned

- Technology-supported interventions require dedicated human resources.
- Planning and budgeting for mobile learning initiatives should include broad internal stakeholder input.
- Adequate participant orientation is critical to ensure engagement in text message training interventions.
- A process for prepayment of airtime subsidies is needed when personal phones are used for workplace purposes.

Conclusion

The m4QI pilot produced a process and software tool that can be replicated globally to improve service delivery in low-resource settings. It allows trainers to manage the delivery of reinforcement and assessment messages to providers, and to make data-driven programmatic decisions for supportive supervision and follow-up training. The results of the m4QI pilot regarding self-reported behavior change support expanded applications with larger-scale populations, in various countries, across a wide range of provider training needs.

Information was excerpted from:
Riley, Pamela and James BonTempo. November 2011. Mobiles for Quality Improvement Pilot in Uganda. Bethesda, MD: Strengthening Health Outcomes through the Private Sector Project, Abt Associates Inc.

MOTECH Suite

Brief Overview

The MOTECH Suite delivers an integrated set of complementary mHealth applications that are scalable, sustainable and readily deployed. The collaborative community of development organizations behind MOTECH Suite has provided an open-source platform addressing the core needs of mobile health, creating a widely-deployed mHealth platform across a wide range of geographies and health interventions.

MOTECH Suite has been used by the Ghana Health Service to increase demand for antenatal care while simultaneously collecting service delivery information from community health workers. In six cities in India, MOTECH Suite is being used to provide care and treatment reminders to HIV-positive patients. In Bihar, India, BBC Media Action has developed services to increase frontline health workers communication skills and knowledge of life-saving maternal and child health behaviors. CARE also uses a MOTECH Suite system in Bihar to track pregnant women, mothers, and children under one along the continuum of care with specific protocols on birth preparedness, delivery, postnatal care, and exclusive breast feeding. World Health Partners is extending timely, quality access to tuberculosis diagnosis and treatment to Bihar's rural population. World Vision has deployed MOTECH Suite-based maternal, newborn, and child health services in Afghanistan, Mozambique, and Zambia and has plans for scaling to Sierra Leone, Uganda, Tanzania, and Zambia.

MOTECH Suite comprises a set of complementary open source technologies from a consortium of partners, including Dimagi, Grameen Foundation, InSTEDD, OnMobile, ThoughtWorks, University of Southern Maine, and others. The MOTECH Suite consortium has core funding from the Bill and Melinda Gates Foundation, as well as project-specific funding from Johnson & Johnson, Government of Norway, and USAID, among others.

- **Geographic Coverage:**
  Over twenty countries including Afghanistan, Ethiopia, Ghana, India, Tanzania, and Zambia

- **Implementation Partners:**
  BBC Media Action, CARE, Dimagi, Ghana Health Service, Grameen Foundation, InSTEDD, OnMobile, ThoughtWorks, University of Southern Maine, World Health Partners, World Vision

- **Funders:**
  Bill and Melinda Gates Foundation, Johnson & Johnson, Government of Norway, USAID

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  Grameen
  - **Tim Wood, Director of Innovations in mHealth;**
    Email: twood@grameenfoundation.org

About MOTECH Suite

MOTECH Suite functionality includes inter-operable workflows within and across five key functional areas: improving demand for health services, managing patient data, improving frontline worker performance, managing the last-mile supply chain, and tracking patient compliance with treatment. Capabilities include:

- Interactive Voice Response & SMS messages
- Educational Videos
- Pay-as-you-go subscription billing
- Registration by mobile form or IVR
- Record sharing across devices/workers
- Patient records
- Checklists and decision support
- Real-time worker feedback
- Supervisor alerts and tools
- Training
- Counseling support
- Real-time monitoring of stock levels
- Automated stock reports
- Automated reminders
- Referral tracking

Common features of MOTECH-based applications are listed below.

- Communicating information to patients via voice or SMS in the patient's languages, according to their individual health needs, including reminders for appointments, taking medications, and childhood immunizations
- Collecting data from patients and caregivers to monitor service use and provision: patients report symptoms before and during treatment, give feedback on service delivery, and caregivers report which services they provided and when
- Alerting caregivers of the status of their patients' health status by notifying them when patients have not taken prescribed medications and missed scheduled appointment
- Facilitating communication between patients caregivers, and/or health administrators by establishing secure peer networks for patients with common concerns and initiating conversations between patients and caregivers in a way that allows the caregiver to manage the workload most effectively

Evaluation and Results

MOTECH Suite has supported Ghana's Mobile Midwife Program for more than two years. There, MOTECH covers 46 facilities and over 1,100 active mobile midwives, and has more than 21,000 registrants. It has delivered nearly 58,000 SMS and voice messages, provided training for 165 CHWs, and uploaded over 134,000 patient records.

The Ghana program is considered a great success. It is being expanded into three new districts in 2012-2013 and the Ghana Health Service is taking on increased management responsibilities as part of a planned transition to deployment across the entire country.

Lessons Learned

Key lessons in using the MOTECH Suite platform in Ghana include:

- Low cost Java-enabled handsets proved to be a more suitable than those which were solely SMS compatible, due to greater capacity to enter data and cheaper data transmission costs;
- Content needs to be locally relevant and delivered in local languages to have impact in rural communities;
- Close integration and collaboration with existing health system operations from the outset is essential; and
- Expect different usage rates for mHealth services based on phone ownership profiles.

Conclusion

MOTECH Suite has great potential to make a difference in the quality of health care delivery and status. The program is steadily growing in scale and maturity and has a strong consortium of partners contributing both technology and field implementation expertise.

Information was excerpted from:
MOTECH Suite: http://motechsuite.org
Mobile Technology for Community Health in Ghana; What it is and What Grameen Foundation has Learned So far; Second Edition: September 2012 http://www.grameenfoundation.org/sites/default/files/MOTECH-Lessons-Learned-Sept-2012.pdf
Mobile Technology for Community Health in Ghana: http://healthmarketinnovations.org/program/mobile-technology-for-community-health-motech

Project Mwana – SMS for Early Infant Diagnosis of HIV

Brief Overview

In Zambia, where the HIV prevalence rate among the general population is 14.3 percent, mother-to-child transmission accounts for 21 percent of all new HIV infections. Although the use of antiretroviral therapy (ART) in HIV-infected pregnant women can prevent mother-to-child transmission, when prevention fails, effective programs for early infant diagnosis (EID) of HIV are critical, because the evidence suggests that early initiation of ART in HIV-infected children can substantially reduce HIV-related morbidity and mortality.

Project Mwana is an innovative health initiative being implemented by the Zambian Ministry of Health with support from UNICEF and their collaborating partners (Zambia Center for Applied Health Research and Development; Zambia Prevention, Care and Treatment Partnership; and Clinton Health Access Initiative). Through the use of RapidSMS mobile technology, the project delivers test results for diagnosis of HIV in infants in real time to rural clinics and facilitates communications between clinics and community health workers. The community health workers then inform mothers that the results are ready for their collection.

Begun as a pilot in 13 districts of Zambia in June 2010, the project has shown a reduction in turnaround time – from sample collection, to laboratory, to the return of test results, to the originating health facility – of more than 50 percent in the country's rural and underserved communities. Zambia has since developed a national scale-up plan and implementation guide, and with UNICEF's support, aims to achieve national scale by 2013.

- **Geographic Coverage:**
  Zambia

- **Implementation Partners:**
  UNICEF is supporting the Zambian Ministry of Health to lead a team of partners which includes: Zambia Center for Applied Health Research and Development | Zambia Prevention, Care and Treatment Partnership | Clinton Health Access Initiative
  During the development and design phase of the pilot, UNICEF also partnered with: Johnson & Johnson | McKinsey & Company | frog™

- **Funder:**
  UNICEF

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Project Mwana – SMS for Early Infant Diagnosis of HIV

About Project Mwana

Project Mwana uses RapidSMS, a free, open-source programming framework that allows developers to build their own SMS-based applications. The project consists of two applications. 'Results160', which speeds up the time it takes for health facilities where the samples are collected to get the results back from the regional processing laboratories, fulfills the project's primary objective of allowing test results to be communicated in a timely, efficient way. All dried blood spot (DBS) samples are sent to regional processing laboratories. The communication of test results occurs via four text messages:

- When test results are ready, the central SMS system sends a message alerting the clinic workers;
- The first clinic worker ready to record the results sends their four digit pin to the server;
- The results are sent to that phone for, formatted to be readable on different screen sizes; and finally,
- A second message reminds the user to write the results down in the register and delete them off their phone.

The second application, 'RemindMi', serves a second project objective, to improve the rate of postnatal follow-up, by reminding mothers to return for their six-day, six-week and six-month postnatal visits in line with Zambia's immunization schedule.

Evaluation and Results

The Zambia Center for Applied Health Research and Development (ZCHARD), a Boston University affiliate and one of the partners on Project Mwana, conducted an evaluation of the pilot phase of the project. The team selected ten public health facilities within two districts in Zambia's southern provinces for inclusion in the study. Overall, 1,009 DBS were collected from infants for HIV testing in the ten study sites over the 19 months before the SMS system was implemented. In the 7.5 months after implementation, 406 such samples were collected at the same sites. The mean turnaround time for delivery of a test result to the relevant health facility fell from 44.2 days pre-implementation to 26.7 days post-implementation. In addition, the results delivered through SMS texting were highly accurate by comparison with the results recorded on paper.

The 'RemindMi' application used to trace patients via SMS to ensure that they receive key childhood interventions now also provides community health workers with a tool to register births. Its birth registration component has been adopted enthusiastically by community health workers, who now use it to register the majority of births in their catchment areas.

It is too early to establish whether the faster turnaround time for results leads to earlier ART access for exposed infants or if SMS reminders significantly increase adherence to postnatal appointments. A full evaluation of Project Mwana's impact is planned for 2013.

Lessons Learned

- Government leadership is critical to ensuring that the project is integrated into long-term planning and the technical, physical, monitoring, and human infrastructure and systems.
- A permanent software development team and project manager should be sourced locally.
- In order to control costs, the project should: negotiate with telecom companies for scale, not pilots; utilize the phones people have rather than purchasing and supporting a national phone system; and create district-level training teams.
- The identified needs of end users should inform decision-making and the development of tools.
- Test early and often; don't worry about failing and stay adaptable. Use open source tools that can be customized to local needs.

Conclusion

SMS technology is a powerful innovation that in Zambia has reduced delays in receiving EID DBS HIV test results, improved communication among health care providers and community volunteers, and more importantly, encouraged patients to return to the clinic for their test results with greater confidence. The experiences from development of the Project Mwana system can serve as the basis for future mHealth projects. The system could potentially be extended to maternal and child health areas such as the prevention of mother-to-child transmission (PMTCT) of HIV and nutrition, as well to other results delivery and diagnostic mechanisms or national health program for women and children.

Information was excerpted from:
http://www.unicef.org/partners/Partnership_profile_2012_Mwana_Zambia_V2_approved.pdf
http://www.who.int/bulletin/volumes/90/5/11-100032/en/index.html
http://projectmwana.posterous.com/
http://www.unicef.org/equity/index 65314.html

SIMpill® Medication Adherences Solution

Brief Overview

Drug adherence is a growing concern to governments, healthcare systems, clinicians and other stakeholders (e.g., tax payers) because of mounting evidence that non-adherence is prevalent and associated with adverse health outcomes and higher costs of care. Rosen et al (2007) found that, on average, 40 percent of patients enrolled in sub-Saharan African antiretroviral therapy (ART) programs had discontinued their treatment after two years. Some examples of poor patient medication adherence include not taking the medication on time, in the correct doses, or at all. Reasons for not following the proper medication regimen include: lack of transportation, bad weather, a worsening condition that prevents them from leaving home, unpleasant side effects, confusion, forgetfulness, language barriers, and feeling "too good" to need medicine. Patients who neglect to take their medications as prescribed pay a price in poorer health, more frequent need for health services, and a higher risk of death.

A number of mobile technology products have been developed to counteract these challenges. One such product is SIMpill® a real time drug adherence solution, which uses SMS to send messages to patients if they forget to take their medication as prescribed and alerts care givers, family members and friends if patients continues to neglect to follow their prescription.

- **Geographic Coverage:**
  South Africa
- **Implementation Partners:**
  SIMPill, Tellumat
- **Funder:**
  SIMpill, Western Cape Provicial Department of Health
- **For More Information Contact:**
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    Tel: 020-8392-6603 or 07810- 850-307;
    Email: brendan.rens@simpill.co.uk or info@simpill.com

SIMpill® Medication Adherences Solution

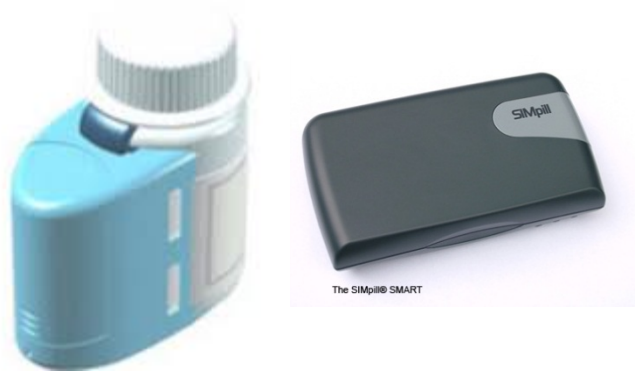
About SIMpill

The SIMpill® Medication Adherence System is a medication management system that monitors the patient's medication intake and will remind the patient in real time if the patient forgets to take the medication as prescribed.

The system allows for:

- Real-Time data and analysis of the patients intake of medication;
- Reminders to the patient when a medication event is missed;
- Escalated reminder service available to approved key caregivers;
- Warnings when patients take their medication at incorrect times; and
- Real-time prescription management.

Using a proprietary web-based program, SIMpill's adherence monitoring system detects non-compliance in real time. Its unique system can escalate a timely, appropriate response to fit the needs of the patient and/or caregivers.



When the patient opens his bottle of medication, an automatic SMS message is sent from the bottle's SIM card to the patient's health facility, which records that the medication has been taken. In the event that the patient does not take the medication as scheduled, a reminder is sent to the patient's mobile phone via SMS. Another SMS message is sent to the mobile phone of a designated caregiver, family member, or friend advising that the medication has not been taken, if the patient still does not comply within a certain timeframe. Opening the bottle to take the medication outside of the prescribed schedule will trigger an SMS message sent to the patient's phone to caution him that the medication should not be taken at the later time, and informing him when next to medicate. Data on levels of compliance and responses to reminders is reported to the health worker caring for the patient.

Evaluation and Results

From July 2006 to April 2007, SIMpill conducted a pilot drug adherence study of 155 tuberculosis patients at three clinics in the Cape Town area in collaboration with the Western Cape Department of Health. After patients used the SIMpill for 10 months, drug adherence stabilized between 86 - 92 percent with a treatment success rate of 94 percent, according to the study, SIMpill:

- Increased the number of patients who keep appointments with the physician;
- Increased self-reported cases of adherence
- Improved health conditions; and
- Helped 90percent of patients comply with treatment compared to the typical 22- 60-percent compliance in the SIMpill intervention

Lessons Learned

- In areas where internet connectivity is unavailable, the SIMpill system will have limited use given that the computer that stores the adherence information and sends out automated SMS is web-based.
- SIMpill's proprietary software might result in an unnecessarily high cost of development and increases the likelihood of software coding problems.

Conclusion

Despite some of the limiting factors associated with the web-based proprietary software, the SIMpill pilot successfully demonstrated that SMS can be used to reminders patients about taking their medication as prescribed.

Information was excerpted from:

http://www.simpill.com/howsimpillworks.html

Use of Mobile Technology to Improve Family Planning and Reproductive Health Programming: A Synthesis of Evidence; Draft Report

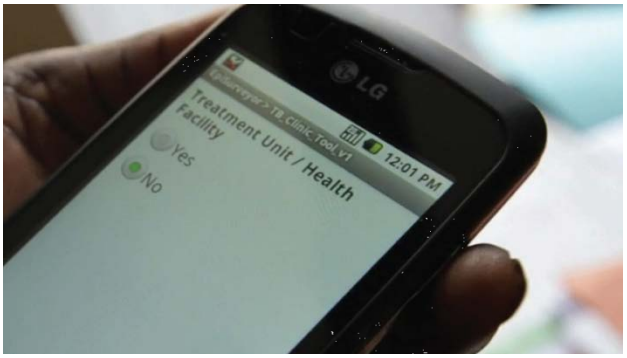
On Cue Compliance http://healthmarketinnovations.org/program/on-cue-compliance; Barclay, E. *Text messages could hasten tuberculosis drug compliance* The Lancet, Volume 373, Issue 9657, Pages 15 – 16, 3 January 2009

http://download.thelancet.com/pdfs/journals/lancet/PIIS0140673608619388.pdf

Unge C, Södergård B, Marrone G, Thorson A, Lukhwaro A, et al. (2010) Long-Term Adherence to Antiretroviral Treatment and Program Drop-Out in a High-Risk Urban Setting in Sub-Saharan Africa: A Prospective Cohort Study. PLoS ONE 5(10): e13613. doi:10.1371/journal.pone.0013613

Supportive Supervision (SS) for TB in Nigeria

Brief Overview



Nigeria ranks tenth amongst the highest-burden tuberculosis (TB) countries in the world. Despite Nigeria's rising TB detection rates and program coverage, many TB cases are still undetected.

To improve the TB supportive supervision system in Nigeria, Health Systems 20/20 (HS 20/20) and its partners, led by Abt Associates, collaborated with Nigeria's National TB and Leprosy Training Center (NTBLTC) to develop a standard, integrated TB supervision checklist to assess and monitor diagnostic laboratories and DOTS services in the public and private sectors. This checklist was then piloted in four states (Abia, Rivers, Kano, and Lagos) in 2010-2011, using personal digital assistants (PDAs).

Automating the checklist allowed for on-the-spot calculations and analysis, resulting in the improvement of supervision, assessment and creation of action plans. Following the pilot, the project scaled up to over 200 facilities in 2011-2012 and upgraded the technology platform to smartphones.

- **Geographic Coverage:**
  Lagos, Abia, Cross River and Kano, Nigeria
- **Implementation Partners:**
  NTBLTC & Health Systems 20/20, Abt. Associates Inc.

  Abt Associates Inc. leads a team of partners that includes:
  | Aga Khan Foundation | Bitrán y Asociados | BRAC University | Broad Branch Associates | Deloitte Consulting, LLP | Forum One Communications| RTI International | Training Resources Group | Tulane University School of Public Health
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Supportive Supervision (SS) for TB in Nigeria

About SS for TB in Nigeria

Supportive supervision visits are done monthly or quarterly at TB care facilities to provide comprehensive monitoring of all clinical, commodity, and laboratory functions. The use of smartphones during these visits have eliminated the need for printed forms, minimized human error in data entry, reduced the lag time for getting data to policymakers and managers, and helped pinpoint ways to improve quality of care.

Moving from a paper-based system to digital supervision entailed the following:

1) Buying the smartphones;
2) Programming the smartphones; and
3) Developing a platform that allowed for data to be immediately analyzed.

The transition also utilized Nigerian expertise in technology and training, specifically national supervisors and trainers, as well as NTBLTC IT experts.

HS 20/20 lead the development and implementation of trainings and hands-on practice for all actors in the system: LGA and state-level supervisors; TB trainers; IT experts; and stakeholders at higher levels of the health system.

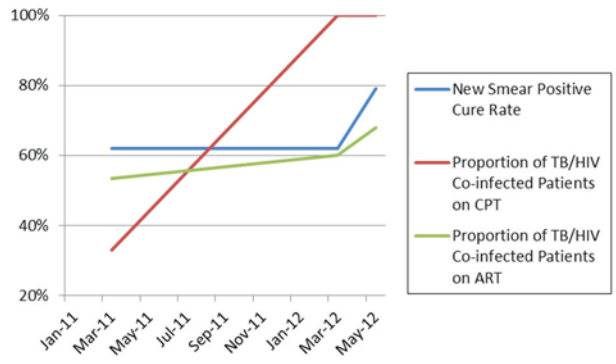
Evaluation and Results

Between 2010 and 2012, the pilot project implemented four rounds of supportive supervision using the smartphones in the four pilot states.

At the end of the pilot, Abia, Kano, and Lagos reported substantial improvements in major areas of TB care, including cure rates, TB/HIV co-infection treatment, and defaulter rates.

To date, over 50 supervisors have been trained in how to use the new smartphones and checklist, and more than 10 trainers are capable of training others how to use smartphones. Additionally, the National TB program has three IT experts who can troubleshoot issues with both the smartphones and the database. Figure 1 shows the impact of this improved supportive supervision process.

Improvements in TB Outcomes in Lagos Mainland 2011-2012



Lessons Learned

- There is a need for strong in-country leadership to facilitate stakeholder buy-in.
- Careful selection of technological inputs is necessary.
- With new systems and technologies it is important to take the time and start small and then build once the issues are resolved.
- Need incremental and planned scale-up.
- Strong programmers and database managers are necessary.
- With the right input, the technology is sustainable.

Conclusion

This is the first time the National TB Program has used technology to improve supportive supervision. The National TB Program is considering using the software platform on the smartphones to link the TB supervision data into the District Health Information Systems, which is currently being rolled out in Nigeria.

Information was excerpted from:
Dieng, Awa. March 2011. Using Technology for Supportive Supervision in Nigeria Powerpoint. Washington, D.C: Health Systems 20/20, Abt Associates Inc.
Dieng, Awa and Leah Ekbladh. August 2012. Smartphones Improve Supportive Supervision for Tuberculosis in Nigeria Brief. Bethesda, MD: Abt Associates Inc.
Photo credit: Trevor Snapp/Digital Development Communications

The Malawi K4Health Mobile Learning Pilot

Brief Overview

Providing health workers with access to current health information can help to improve the quality of health services. However, health managers and providers working at all levels to provide HIV and family planning services frequently lack up-to-date and relevant information. Existing information is often scattered, too technical, and difficult to access. Health workers tend to rely on outdated information, even when new guidelines or protocols have been introduced at higher levels of the health system.

The Knowledge for Health (K4Health) Malawi Pilot Project was funded by USAID and implemented by Management Sciences for Health (MSH) as part of the Global K4Health project led by Johns Hopkins University Center for Communication Programs in partnership with MSH and FHI 360.

The K4Health Malawi Pilot Project was designed in 2009 as a small Mobile Learning project, designed to improve access to and use of information by health care providers at the district all level of the health system in Malawi. The project aimed to show that providing health workers with access to current, relevant family planning, reproductive health, and HIV/AIDS information improves the quality of health services. The project worked with health managers and service providers at the national, district and community levels and ended in December 2011.

- **Geographic Coverage:**
  Nationwide; Salima and Nkhotakota districts, Malawi
- **Implementation Partners:**
  The Global K4Health project led by Johns Hopkins University Center for Communication Programs (JHU-CCP) in partnership with Management Sciences for Health (MSH) and FHI360
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  MSH
  - **Natalie Campbell, K4Health Malawi Manager;**
    ncampbell@msh.org

The Malawi K4Health Mobile Learning Pilot

About Malawi Mobile Learning Pilot

In order to provide up-to-date information in a more efficient manner, a system was developed at the district level to provide information to community-based health workers.

This distance learning program included four key components.

- A six-month Leadership Development for Knowledge Management (LD for KM) program: developed for participants from the national and district levels to align and mobilize them around the need for improved knowledge exchange.
- A national taskforce: formed to manage and disseminate technical information on family planning, reproductive health, and HIV/AIDS.
- District Learning Centers (DLC): established in the district health offices of Salima and Nkhotakota.
- A pilot mobile health program in Salima and Nkhotakota districts using SMS was implemented.

In collaboration with Frontline SMS, an SMS-based mobile telephone network was established that allows community health workers to send text messages between cell phones and other devices. Through the mobile network, the program alerts these health workers to new resources, training opportunities, changes in protocols, and other relevant knowledge exchange and public health activities in their district.

Evaluation and Results

Since the launch of the project in May 2010, K4Health project has achieved the following:

- 663 cell phones and solar chargers distributed to Community Health Workers, serving a catchment area of 652,326 Malawians;
- 1,059 SMS messages on RH/FP and HIV sent to the hub;
- Faster feedback from supervisors; with the phones the average time to receive feedback was nine minutes as opposed to over one day;
- Improved both the reliability of clinical information and the detection and prevention of stock-outs;
- Increased CHW self-confidence and client trust;
- More efficient referrals and widened coverage;
- Reduced costs of reporting to supervisors from $3.06 using public transport to $0.48 using SMS; and
- Prompt responses to outbreaks; the average time went from 523 minutes to three minutes.

Lessons Learned

- Developing a limited number of new features, such as automated responses for frequently asked questions by CHWs, might improve the use of the SMS network.
- In addition to expanding access to health information, the SMS network facilitates knowledge exchange between CHWs and higher levels in the health system.
- Since measuring the effect of using SMS network on quality of care was a challenge, the project team should consider tracking how the SMS network affects the inputs into quality of care (e.g., stockouts and quick resolution of problems) and health service indicators (e.g., contraceptive use) as proxy indicators of quality.

Conclusion

Most importantly, a final project evaluation found that the pilot project demonstrated immediate benefits to front line health workers in the areas of increased knowledge, greater self-confidence, cost and time savings, and widened service coverage.

In the context of sustainability, strengthening the Malawian health system at district level is an important investment of resources to provide timely and informed services to clients. The K4Health project provides a good platform for data collection and information dissemiation via text messages in low income countries.

Information was excerpted from:

K4Health Malawi Project Overview; http://www.k4health.org/malawi#toolkit

mHealth in Malawi: Improving Access to Family Planning and Reproductive Health Information – Thozani Bema K4Health Network Coordinator

K4Health Malawi Project Overview; : http://www.k4health.org/sites/default/files/Malawi%20Fact%20Sheet_1-pager.pdf

Nancy Vollmer Lemay, Tara Sullivan, Brian Jumbe & Cary Peabody Perry (2012): Reaching Remote Health Workers in Malawi: Baseline Assessment of a Pilot mHealth Intervention, Journal of Health Communication: International Perspectives, 17:sup1, 105-117. Available at http://dx.doi.org/10.1080/10810730.2011.649106

For more information, please visit
http://www.africanstrategies4health.com/resources.aspx

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