

DRAFT**mHealth: Emerging High-Impact Practices for Family Planning**

This **DRAFT brief** on the use of mobile technologies in support of family planning and reproductive health has been prepared by the FHI 360/PROGRESS project and the Johns Hopkins Bloomberg School of Public Health/Knowledge for Health project. This is the *first draft* of a brief on mHealth in the High Impact Practices (HIPs) in Family Planning series, developed through the U.S. Agency for International Development (USAID), collaborating with UNFPA. This topic is currently classified as an “emerging practice” in the HIP series. An “emerging” practice for the series is defined in this way: “Some consolidation of the knowledge base, some research indicating associations and some initial experiences with developing interventions exist, but there is a need for more intense intervention development and research. Incorporation of these interventions into programs should carefully consider investments until more research has been completed.”

Please send comments on this draft to Stacey Succop (ssuccop@fhi360.org). For more information on the HIPs and samples of current HIP briefs, go to: <http://hips.k4health.org/about-hips>.

What is the practice?

mHealth is an emerging, rapidly-evolving practice that uses mobile and wireless technologies to support the achievement of health objectives (WHO 2011). Mobile technologies include mobile phones, patient monitoring devices, personal digital assistants (PDAs) and other wireless devices, and mobile software applications.

Because mobile phones are rapidly becoming one of the most widespread communication channels in the world, mHealth has enormous potential for reaching underserved populations and improving access to and uptake of family planning and the quality of family planning and reproductive health services.

Background

There has been an explosive growth of mHealth programs since 2005, driven by declining mobile phone costs, growth in mobile subscriptions, and rapid technology innovation, along with an acute shortage of health workers and a need to expand access to services beyond the bounds of clinic settings (Lemaire 2011; Van Heerden 2012). Governments of many developing countries view mHealth as an important strategy for achieving their Millennium Development Goals (MDGs) (WHO 2011).

mHealth programs provide a range of educational and support functions for achieving family planning and reproductive health goals. While these programs can be categorized in myriad ways, in general, they fall into two broad categories of mHealth practice: (1) client-centered and (2) health system strengthening. However, many programs straddle these categories, and mHealth programs will increasingly integrate multiple functions in one tool.

- 1. Client-centered** programs are designed to provide health information and support directly to clients or members of the general public. Examples of client-centered mHealth programs include **m4RH** (a text-message, opt-in, automated system that provides users with evidence-based information on nine FP methods, and a clinic locator database) and **CycleTel** (a text message system that facilitates use of the Standard Days Method of family planning).
- 2. Health system strengthening** programs provide training and counseling/job aids for health workers and support for health systems, data, and program management. Examples of health system strengthening mHealth



programs include the **CommCare platform** (a mobile phone-based platform that allows users to collect and send health system data, complete and submit forms and surveys, perform case management, and utilize other multimedia options wirelessly) and **ILS Gateway** (an integrated logistics system on mobile phones that provides alerts, supply chain management tools, and reporting functions for stock and ordering of medicines and other health products).

Because the field is advancing at a rapid pace, there is a need to document and highlight key lessons learned to help guide the next generation of mHealth programs. First generation projects have established the acceptability and usability of mHealth through small-scale pilot programs that typically have a single solution and content focus (WHO, 2011). Second generation programs are more likely to be interoperable, integrated into the health information system, and incorporate multiple functions on the same device (AIDSTAR-Two Project 2012; Van Heerden 2012; Mecheal 2010).

Evidence of mHealth impact on various health outcomes and systems is newly emerging, with some initial, rigorous evidence available showing the positive impact of mHealth on patient medication adherence, improving health workers' compliance with treatment guidelines, increasing access to health information, and encouraging healthy behaviors (L'Engle 2012; Lemaire 2011; Levine 2008; Deglise 2012; Pop-Eleches 2011; Lester 2010).

Why is this practice important?

In 2011, there were 5.9 billion mobile subscribers worldwide out of the estimated 6.9 billion people - corresponding to a global mobile phone penetration of 87%. Almost 80 percent of mobile subscribers live in the developing world. Mobile phones are seemingly everywhere, and the growth of mobile phones is being driven by demand in developing countries. In 2010 alone, developing countries saw a 20% annual growth rate in mobile subscriptions with no signs of slowing down (ITU 2012a; World Bank 2011). From 2005 to 2010 mobile subscriptions in developing countries grew 221% (ITU 2012b).

One factor driving increased growth rates is price. Across the globe, telecommunications as well as Internet services are becoming more affordable. Between 2008 and 2011, the price of ICT services dropped by an average of 30% (ITU 2012c).

While the mobile market is reaching saturation in developed countries, mobile phone penetration is expanding in developing countries. Between 2005 and 2010 the growth rate of mobile phone subscriptions (measured per 100 people) grew by over 100% in Europe. However, in Sub-Saharan Africa, mobile telephone subscriptions grew by 274% while South Asia had a staggering 665% increase. When examining increases in mobile phone penetration by income group, it is clear that the rapid pace of growth worldwide is driven by low income countries (World Bank and ITU 2012).

Mobile phone telephone subscriptions (per 100 people)	2005	2010	Growth (%)
Low income countries	4.6	33.3	624
Middle income countries	26.9	78	190
High income countries	84.2	110.8	32

Mobile phone ownership data at the country level provide additional information about use. In 2009 in Kenya, 47% of the population owned a mobile phone, while 80% of the population reported access to a mobile phone. Ownership of mobile phones was greatest in the younger age cohorts: those aged 25–39 were the most likely to have a mobile phone (38%), followed by those aged 40–54 (22%) and lastly those aged over 55 (18%). Men were more likely to own a mobile phone as were people in urban areas, people who had at least a primary school education, and people who had a bank account (Aker 2010). Data from 17 sub-Saharan African countries in 2010 confirmed these findings, showing that mobile phone owners were more likely to be male, over the age of 18, living in urban areas, and educated (Tortora 2011). Based



on the continued and dramatic growth in mobile phone penetration worldwide, mobile phones increasingly will be owned by people living in rural areas, women, and aging populations.

What is the impact?

Evidence documenting the impact of mHealth on health and system outcomes is sparse and only recently available. Two journals – the *Bulletin of the WHO* and the *Journal of Health Communication* – released mHealth-themed issues in 2012, helping to push the mHealth evidence base forward. Based on review of mHealth evidence related to family planning and other health areas published in peer-reviewed journals to date, several key points have emerged.

1. **Client-Centered mHealth Programs.** Text message programs for health promotion have been well-accepted by beneficiaries (Deglise 2012) and may be an effective tool for behavior change (Cole-Lewis 2010; Gurman 2012; Horvath 2012). Numerous issues must be considered when designing and implementing client-centered programs, including mobile phone access, sharing of phones, language and literacy, privacy, and technological challenges. More information is needed about best practices for developing content for text message delivery and the optimal timing of messages (de Tolly 2012; Gold 2010).
2. **Health Systems Strengthening mHealth Programs.** Although point of care mHealth programs are proliferating and health systems are increasingly turning to mobile phone solutions for health care strengthening, little evidence for mHealth impact in this area exists. Emerging evidence does suggest that providing health workers with reminders of protocol guidelines for patient care via mobile phone results in better treatment compliance by health workers (Florez-Arrango 2011; Zurovac 2012). Further, evidence is emerging that mHealth can be effectively used for supply chain management (Barrington 2010) and more efficient delivery of community health services (Lemay 2012). Key considerations for mHealth systems strengthening programs include encouraging health provider use of mHealth tools and how these tools are linked to the health information system at the facility and district levels.

Key peer-reviewed journal articles that focus on mHealth for family planning are summarized in Table 1. Notably, very limited evidence is available documenting the use of mobile phones for family planning.

Table 1: Peer Reviewed Evidence on mHealth for Family Planning

Key Findings	Summary of Evidence	Sources
SMS network bridges gap between district staff and CHWs	K4Health (Malawi) K4Health designed an 18-month demonstration project intended to test different ways to improve the exchange and use of FP/RH and HIV/AIDS knowledge within the health system in Malawi. The project intervention included development of an SMS network to improve communication and information sharing among CHWs and communication between CHWs and district teams. Findings indicate that the SMS messages and phone calls are at least four times cheaper and at least 134 times more efficient in getting feedback than traveling to communicate directly with supervisors at the district level.	Lemay et al. (2012)
Information about FP methods can be delivered effectively by mobile phone	Mobile for Reproductive Health - m4RH program (Tanzania) Mobile for Reproductive Health (m4RH) is an opt-in interactive and menu-based SMS system that provides automated information about eight different FP methods. m4RH messages are free to the user and available across all cell phone providers. During a 10-month pilot, m4RH was promoted in a small number of FP clinics in Tanzania. Evaluation results suggest that FP information can be feasibly delivered via mobile phone, may reach different population segments, and has the potential to impact contraception and condom use behavior.	L'Engle et al. (2012)

SMS reminders improved OCP continuation	Effect of daily text messages on OCP continuation (USA) At one family planning health center in New York City, young women who elected oral contraceptive pills were randomized to routine care or routine care plus 180 days of daily educational messages by SMS. Educational messages were adapted from a pamphlet on OCP risks, benefits, side effects, use, effectiveness, and mechanisms of action. At six months, women in the intervention group were significantly more likely to continue oral contraception compared with the control group.	Castaño et al. (2012)
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Table 2 summarizes selected evidence showing how mHealth has been used to improve both client-centered and health system outcomes in other health areas. These mHealth studies were selected for their relevance and potential utility for expanding access to family planning.

Table 2: Peer Reviewed Evidence on mHealth for Other Topics

Key Findings	Summary of Evidence	Sources
Text messaging is a feasible and acceptable way for youths to receive information and service referrals	SEXINFO (USA) SEXINFO is an opt-in text messaging service which provides basic facts about sexual health and relationships, as well as referrals to youth-oriented clinical and social services for at-risk youths in San Francisco, California. In the first 25 weeks of service, youth frequently accessed information related to STIs and pregnancy, and evaluation data showed positive associations between demographic and geographic risk factors for STIs and campaign awareness.	Levine et al. (2008)
SMS reminders improved ART adherence	Mobile technologies improve adherence to antiretroviral treatment in a resource-limited setting (Kenya) At one rural health center in Kenya, new ART patients assigned to an intervention group received either short or long SMS reminders at a daily or weekly frequency. Weekly SMS reminders increased the percentage of participants achieving 90% adherence to ART by 13-16% compared with no reminder.	Pop-Eleches et al. (2011)
	Effects of a mobile phone short message service on antiretroviral treatment adherence in Kenya (WeTel Kenya1) At three clinics in Kenya, HIV-infected adults initiating ART randomized to a mobile phone SMS intervention received weekly text messages to inquire about their status and to remind them about the availability of phone-based support. Self-reported ART adherence was significantly better in the SMS group compared with the group receiving standard care.	Lester et al. (2010)
SMS reminders increased skilled delivery attendance	Wired Mothers (Zanzibar) At selected primary health care facilities in six districts in Zanzibar, women attending antenatal care at an intervention health facility received an SMS intervention that provided simple health education and appointment reminders to encourage attendance to routine antenatal care, skilled delivery attendance and postnatal care. The mobile phone intervention was associated with an increase in skilled delivery attendance, particularly among urban women.	Lund et al. (2012)
SMS reminders improved quality of pediatric malaria case management	The effect of mobile phone text-message reminders on Kenyan health workers' adherence to malaria treatment guidelines: a cluster randomised trial (Kenya) This study tested (in 11 rural districts) whether text message reminders sent to health workers' mobile phones could improve and maintain health workers' adherence to national guidelines for the management of outpatient pediatric malaria. The intervention group showed improved malaria case management compared with the control group immediately following and six months after the intervention.	Zurovac et al. (2012)
Rich media clinical guidelines on	Performance factors of mobile rich media job aids for community health workers (Colombia) This study investigated the possible benefit on performance of 50 CHWs of point-of-	Florez-Arango et al. (2011)

mobile phones reduces CHW errors	care clinical guidelines implemented as interactive rich media job aids on small-format mobile platforms. The intervention reduced errors by 33% and increased protocol compliance by 30%.	
SMS reporting reduced stock-outs of anti-malarials	SMS for life (Tanzania) SMS for Life, a 21-week pilot study involving 129 health facilities in three rural districts, used mobile phones to facilitate accurate stock counts of anti-malarial medications. The pilot provided visibility of anti-malarial stock levels to support more efficient stock management using simple and widely-available SMS technology.	Barrington et al. (2010)
Reporting on patient-specific clinical information showed no improvement in outcomes	Impact of a mHealth intervention for peer health workers on AIDS care in rural Uganda Peer health workers in the mHealth intervention group used phones to call and text higher level providers with patient-specific clinical information. The intervention group did not perform better than the control group on virologic, adherence, mortality, or retention outcomes, although qualitative analyses found improvements in patient care and logistics and broad support for the mHealth intervention within the health system.	Chang et al. (2011)

Rigorous evidence and best practices are needed in the following broad areas:

- Rigorous evaluation of the impact of mHealth on clinical and behavioral outcomes;
- Examinations of cost effectiveness and cost benefits of mHealth tools;
- Investigations of the influence of mHealth on the wider healthcare system particularly at scale; and
- Successfully scaling up mHealth programs.

How to do it: Tips from implementation experience

The information below is a synthesis of guidance from published literature, gray literature, and in-depth interviews with 18 experts in the field (see Appendix 1). The tips for implementing mHealth programs are divided into five components of mHealth implementation: (1) planning and design; (2) technological considerations; (3) scale-up; (4) sustainability; and (5) evaluation. These guidelines are important for mHealth programs for family planning and are equally applicable to other mHealth programs areas.

PLANNING & DESIGN: Determine if your proposed mHealth solution is appropriate for the context.

Planning and design for mHealth programs requires specific attention to the context in which the mHealth solution will be deployed. Key contextual components to consider are the health issue to be addressed, local stakeholders, and end-users of the program, among other things. Ideally, a proposed mHealth solution will be initiated to address a health problem identified by the local community. Meaningful involvement of stakeholders and end-users throughout design and implementation is crucial; continuous and iterative testing and monitoring of the mHealth program concept, content, and usability with stakeholders and end-users helps ensure buy-in as well as program relevance and comprehension and ultimately success.

Subsidizing mHealth

Frequently mHealth implementers must decide whether to provide equipment or other benefits (such as airtime) to program users. Some experts advocate that end-users access programs through their own mobile equipment and pay related airtime/fees as with other services. This ensures that end users are already familiar with the mobile equipment and are invested in keeping it. It can also increase the perceived value of the service to the end-user if they have to pay something for it. Others believe that in order to maximize uptake and access to the mHealth program, equipment and related operational costs should be subsidized or provided for free. The implications of these options are important to consider for the long-term sustainability of the project. While subsidizing equipment and fees may be feasible for a small pilot project, it may not be practical when the project is scaled up. On the other hand, expecting end-users to pay for a new technology may limit its reach and use. Some mHealth implementers are anticipating and addressing these challenges by applying sound business models to the program or exploring partnerships with private companies willing to donate goods and services.



Considerations

- Is the health or development issue determining the technology solution?
- Is the technology solution appropriate for the setting where it will be introduced?
- Is the program design guided by the mHealth evidence base and other relevant literature?
- Is the program content developed based on national or international guidelines or policies for the health issue or health system?
- Is the end-user involved in the design and testing of the program?
- Are local stakeholders (MOH, policy-makers, funders, NGOs, technology partners) supportive of the proposed project goals and objectives? Is there potential for a coordinating body to provide project oversight, guidance, and leadership to partners?
- Does the program include a monitoring and evaluation plan?

TECHNOLOGICAL CONSIDERATIONS: *Determine to what extent the proposed mHealth project will work with existing technologies, infrastructure, and capacity.*

A clear understanding of and agreed-upon expectations for the technological component of the project will aid implementers in choosing a technological partner and ultimately determining what is needed and what can be leveraged from the local context. Networking with stakeholders, local officials, and other local organizations on the ground will help implementers evaluate local technological strengths and limitations. Consistent and effective communications between program implementers and the selected technological partner are critical.

Considerations

- Are there existing technological platforms or open source tools that can be leveraged? What will need to be built or developed from the ground up?
- What is the local technological capacity to support the development, maintenance, and potential growth of your mHealth project? Is global technological expertise needed?
- What are the national regulations and/or policies regarding mHealth, if any, where the project will be deployed? To what extent will existing policies and/or stakeholders enable the project?
- What is the extent of technology knowledge and use among the proposed end-users? Will the proposed mHealth solution present a steep learning curve for end-users?

SCALE-UP: *Determine the potential for the project to be implemented on a larger scale.*

Many early mHealth initiatives have not scaled up after the pilot phase. Notable barriers to scaling up mHealth include limitations of current funding mechanisms, lack of evaluation, and the absence of standardized indicators. To justify large-scale implementation, new

Country-level Coordination

As the field of mHealth grows at a rapid pace, national governments are increasingly in need of specific policies and regulations to facilitate oversight of mHealth work within their borders and to connect it to other eHealth initiatives. In 2012, the World Health Organization (WHO) released the National eHealth Strategy Toolkit to help governments seeking to develop such guidelines. The presence of such policies can facilitate the implementation of mHealth programs by providing a pathway for official government approval, articulating expectations for procurement of technology and ownership of data, and by defining priority services and populations. In the absence of explicit policies, implementers should seek as much information as possible, as soon as possible, from the government in order to mitigate the chance of a regulatory challenge mid-way through implementation. A useful entry point for obtaining this information may be mHealth working groups which are convening in some countries as a forum to share knowledge and coordinate and activities. The Tanzania mHealth Community of Practice, formed in November 2009, is chaired by the Ministry of Health and brings together mHealth implementers, donors, academic institutions, and technology consultants. In addition to promoting strategic coordination, this type of knowledge-sharing platform helps key stakeholders identify and agree upon program expectations.



mHealth projects must not only be grounded in and recommended by rigorous evidence, but they also must be attentive to health priorities, existing local capacities, and sociocultural challenges within a given country.

Considerations

- To what extent will the mHealth solution be accessible to wider audiences? To what extent is the program adaptable to different sociocultural contexts?
- What is the potential for cost efficiencies if the mHealth solution is offered on a larger scale?
- What is the capacity of the local technological partners and community to support the technological requirements of the scaled-up program?
- What is the potential of the mHealth program to contribute to additional health and/or development issues as well as broader national mHealth goals?

SUSTAINABILITY: Consider the accessibility of resources for the long-term operation of the project.

Quantifying upfront costs, scale-up costs, and potential cost savings is critical for securing government and private sector investments in mHealth. Additionally, nurturing local capacity to develop and maintain mHealth systems also will ensure long-term operation. Open mHealth systems, which promote shared data standards and freedom to modify system functionality, also are viewed as potential future drivers of mHealth’s scalability and sustainability.

Considerations

- What would be the potential value added for private sector support of your program? How can this project leverage the expertise and support of international technology partners (or other potential business partners) who may be willing to provide long-term support?
- Will the evidence/outcomes generated by the project justify continued funding?
- Does the project use cost-effective technologies, or open-source systems?
- Does the project have a plan for building local capacity to maintain and develop state-of-the-art solutions?

EVALUATION: Assess the potential contribution of evidence generated by this project.

As the field of mHealth has grown, it has become increasingly important for project implementers to be able to demonstrate positive outcomes of their projects, including measurement of impact on both health and health systems. Designing a strong evaluation component for a project from the beginning, in conjunction with partners and stakeholders, will not only help ensure long-term support from stakeholders and funders, but also will help grow the evidence base for the larger field of mHealth. Key areas where evidence and best practices are needed were outlined above.

Considerations

- How does the project incorporate measurement and evaluation indicators to meet the evidence and reporting requirements of stakeholders and funders?
- Are data generated by the project leveraged for evaluation and reporting?
- Does the project measure health outcomes? Does the project measure how the health system is influenced by the project?
- Does the project measure the financial cost of implementation and/or incorporate any cost-benefit analyses?
- Does the project incorporate standardized mHealth indicators?



Tools and Resources

- mBCC Field Guide
- mCap [if available]
- Global guidelines for content development
- mHealth WG and toolkit / mHealth Alliance
- National e-Health Strategy Toolkit
- Economics of e-Health and m-Health
- Scaling up Mobile Health – ADA White Paper
- Mendeley; HUB; mobileactive.org; hingx.org
- mHealth: a Developing Country Perspective

Appendix 1: Expert Interviews

- Andrew Sideman, FHI 360
- Berhane Gebru, FHI 360
- Bhupendra Sheoran, ISIS
- Carrie Miller & Ognen Plavevski, Catholic Relief Services
- Christine Lasway, FHI 360
- Heather Vahdat, FHI 360
- Isaac Holeman, Medic Mobile
- James BonTempo, JHPIEGO
- Jeanne Koepsell, Save The Children
- Marasi Mwencha, JSI
- Meredith Puleio, IRH/Georgetown
- Merrick Schaefer, World Bank
- Natalie Campbell, MSH
- Neal Lesh, Dimagi
- Nina Frankel, IntraHealth
- Pam Riley, Abt Associates
- Priya Jha, IRH/Georgetown
- Peggy D'Adamo, USAID
- Rebecca Braun, University of California at Berkeley

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We are seeking feedback on this brief. Please take a moment to respond to the questions below. Please email your responses to Stacey Succop (ssuccop@fhi360.org). Thank you.

1. Do you have recommendations for other successful case studies of mHealth for family planning to consider for inclusion?
2. Is there any additional evidence related to mHealth for family planning that we are missing in this document?
3. Regarding the tips for mHealth implementation, are there additional considerations to include within the five components of implementation?
4. Considering the grey boxes in the tips for mHealth implementation section, are there other pressing issues to highlight?
5. What other tools or resources would you recommend that we include?
6. Do you have any additional general feedback about this document?

