

## The Use of mHealth to Strengthen Health Systems

**mHealth applications show promise for strengthening the individual components of a health system and their relationships.**

In the global health community, there is growing excitement surrounding the opportunities offered by the expansion of mobile phone infrastructure in low- and middle-income countries to address a variety of health-related issues. This use of mobile technology as a tool to improve health care effectiveness and/or efficiency is called “mHealth.”

A burgeoning body of evidence suggests that mHealth can improve patient self-management, provide effective means of communication between patient and facility, support health worker supervision, provide job aids to workers of all skill levels, broadcast health information, rapidly return test results, and reduce errors in data collection and entry, just to name a few.<sup>1</sup>

Using mobile technology tools in public health is frequently cited as a way to improve access, coverage, quality, or safety of health care services, all of which are criteria to judge the performance of a health system. However, the use of mHealth remains limited in scope and focus, and it is rare that mHealth project designers and managers seek to situate the intervention or tool within a larger health system framework. The absence of “systems thinking” in the design and execution of mHealth projects or in the mHealth component of disease focused projects may be a missed opportunity to strengthen health systems or cause negative effects on some functions of the health system and the project sustainability.

### **Relevance of mHealth for health systems strengthening: What we know**

A health system can be viewed in terms of its components or “building blocks.” The FHI 360 health systems framework (based on a World Health Organization framework), identifies seven components and shows the links and interdependencies among them. This framework will be used to organize the evidence from a brief review of the literature.

There is little evidence that specifically examines mobile technology interventions or projects in terms of their effects on health systems. However, much of the existing knowledge base alludes to the strengthening of a particular system of care or health system “component.”

*Service Delivery:* Mobile technology is frequently used to support functions of the service delivery component of the health system. Direct-to-patient phone interventions have been shown to improve adherence to drugs, especially for chronic diseases in higher-income countries. Issues of adherence to treatment can have multiple causes: health service delivery, structural factors, social

context, and individual factors. Several studies suggest that low adherence is influenced by lack of communication with providers<sup>2,3</sup> and recent studies, including some randomized controlled trials, suggest that SMS (short message service) reminders improve adherence to drug treatment for antiretroviral drugs and tuberculosis in lower income settings.<sup>4,5,6</sup> Mobile diagnostics have shown promise in isolated case studies, allowing diagnosis of diseases from malnutrition to cervical cancer to occur at the point of care without the need for the patient to return for test results.<sup>7,8</sup>

*Health workforce:* mHealth applications can support task-shifting from more highly skilled workers to lower skilled workers, especially for community health workers.<sup>9</sup> A growing area of mHealth is the use of mobile technology for remote health worker coaching or in-service learning.<sup>10,11</sup>

*Supply chain/medical products:* Mobile phones and mobile phone applications show promise in the area of commodity and other logistics management. Using mobile phones, SMS messages, and electronic mapping technologies, it is possible to track stock levels of medications at a variety of levels of health facilities and to avoid stock outs.<sup>12</sup> It is also possible to link bar code scanners and radio frequency identification (RFID) to mobile devices. This can increase accuracy of inventory monitoring.

*Health information and patient data:* As an information and communication device, mobile technology naturally lends itself to use as a transmitter and receiver of health data and patient information. Initially with personal digital assistants (PDAs) and later with mobile phones and smart phones, public health practitioners have found mobile technology to be a tool well-suited for data collection, with mobile technology frequently proving cheaper, less prone to error, and quicker than its pen-and-paper counterparts.<sup>13,14</sup> Other projects have piloted the use of mobile technology for disease surveillance, demonstrating the feasibility of using mobile technology to report disease outbreaks.<sup>15</sup>

*Leadership & governance:* In leadership and governance, there is very little evidence that mobile technology specifically strengthens this health system component, but many pilot projects anecdotally report that using mobile technology for supervision, health information, or supply chain management puts real-time information more easily in the hands of health officials and other decision makers.

*Health financing:* A surprising amount of synergy exists in the area surrounding health financing and mobile technology. In low- and middle-income countries, mobile phones are frequently used to transfer money. Many healthcare leaders hope to harness this energy to disburse vouchers or provide insurance co-pays via mobile phones.

*Community:* At its core, a mobile phone is a tool for communication. Mobile technology can be useful for

connecting the community with the formal health sector, through improved emergency medical response. A natural application of mobile phones is to facilitate emergency medical response systems through access to emergency transportation by contacting a central dispatch number. In many low-income countries, where these systems do not exist publicly, private companies have harnessed the growing penetration of mobile technology to contract with governments to provide ambulatory services.

Additionally, mobile phones are useful channels for the community to access public health messaging and information. FHI 360's m4RH (Mobile for Reproductive Health) project, for example, developed, tested, and deployed a set of text messages on family planning methods that users can access by texting a short number and navigating through a menu of options. Phone interviews and text message surveys with m4RH users indicate that users of the system learn new information about the full range of contraceptive methods, show increased knowledge about family planning, and change their behavior after viewing m4RH messages (based on self-report). Also, m4RH users share messages with others.<sup>16,17</sup>

While the literature review reveals promising applications for mobile technology in the realm of health, many knowledge gaps remain in this nascent area, including:

*Pilot proliferation, scale, and sustainability:* Many current mHealth projects are implemented as pilots or stand-alone projects. Small mHealth pilots are so prolific in certain countries that some Ministries of Health have banned any further mHealth pilots in their country. Few mHealth projects have been scaled up in significant ways, and when they have been, they run the risk of ending when funding dries up.

*Cost effectiveness and cost-benefit:* While funders, Ministries of Health, and implementers alike have expressed interest in better understanding cost effectiveness and cost-benefits of using mHealth tools (over existing systems), very little evidence exists as to this benefit. Frequently, researchers or program managers cite that a mobile technology tool or application was less expensive than another model of care, supervision, management, or data collection. However, a cheaper program is not necessarily a more effective program. Evidence of the effectiveness of mHealth tools in achieving desired outcomes per unit of cost is necessary.

*Interoperability and standardization:* Many mHealth tools or programs exist to address single diseases or functions of the health system, e.g. reminding HIV/AIDS patients to take their medication, streamlining supervision checklists for health workers, or guiding a nurse through a counseling session. Many of these systems cannot "talk" to each other

or do not integrate with the existing health information system. These various systems can lead to underuse of data and a failure to meaningfully use the system to contribute to the greater health information system. Integration of systems is difficult and takes time, but future mHealth programs will need to consider whether their mHealth program is interoperable with other existing platforms in the country.

### Strategic mHealth & systems thinking: FHI 360 approach

Using systems thinking to design, implement, and coordinate mHealth projects can facilitate the use of mHealth not just to improve a disease-focused program or strengthen an individual building block or component, but also to strengthen relationships *among* components.

With “systems thinking,” project designers and evaluators try to understand and appreciate the relationships between components of a given system, revealing underlying characteristics and acknowledging the complexity of the setting within which work is being performed. Moreover, a thorough project planning process that takes into account the ecosystem in which a program will be operating can help to avoid pitfalls in mHealth project design and improve the chance that the project will be effective and, if successful, scaleable and sustainable.

FHI 360's health systems strengthening unit has developed a set of questions and guidelines to design mHealth projects using systems thinking. Our approach focuses on determining if it's clear why an mHealth intervention makes sense in the context of a given problem as compared to more traditional or standard ways of addressing the problem, and the explicit logic as to why mobile technology used in the way proposed could lead to desired outcomes and objectives. These guidelines also urge users to consider any possible negative effects of introducing mobile technology and how to mitigate such negative effects. These various systems can lead to underuse of data and a failure to meaningfully use the mobile technology to contribute to the greater health information system.

### Examples of mHealth at FHI 360

FHI 360 has a variety of experiences with mHealth. Some select examples are included below.

**m4RH:** Mobile for Reproductive Health (m4RH) is an opt-in interactive and menu-based short message service (SMS, or text message) system that provides automated information about eight different long-acting, short-acting and coitally dependent family planning methods. Begun in Tanzania and Kenya, m4RH is now being expanded to focus on sexual and reproductive health information needs of young people in Rwanda.

**Mobile phone-based job aids for community health workers (Tanzania):** FHI 360 is working with Pathfinder International and D-Tree to develop and pilot the use of a mobile phone-based family planning job aid for community health workers (CHWs). In a randomized control trial, the mobile phone-based job aid is being compared to a paper-based job aid to examine effects on data, reporting, and referrals.

**Using an SMS platform to improve the system of tuberculosis care (Indonesia):** In this pilot, newly-diagnosed adult TB patients at a facility in Jakarta, Indonesia, opt in to a system where they will receive daily SMS (text message) reminders to take their TB treatment. They also receive weekly “health promotion” messages advising them on issues relevant to TB care, such as undesirable side effects, possibility of spreading the disease to family members, or refilling medication. Moreover, patients will have the ability to notify a project manager/healthcare provider if they have any questions or concerns by simply texting a code in reply to any message they receive from the system.

**SATELLIFE's GATHERdata:** FHI 360's SATELLIFE office has created the GATHERdata platform, a sophisticated, real time information, alerting, analysis and reporting platform that uses data collected on mobile devices. It includes powerful tools for a full range of data collection needs, from form development to data submission to analysis of collected data.

**“Text me! Flash me!”:** In Ghana, the former SHARPER project's Text Me! Flash Me! enables men who have sex with men to receive health messages and referrals through text messaging. They also can request a call back from a helpline staffed by certified counselors trained by the national AIDS program. The initiative was expanded to include female sex workers and has increased the use of HIV counseling and testing and treatment services for sexually transmitted infections by both groups.<sup>19</sup>

### Services FHI 360 can provide

- Proposal guidance, writing, and/or program design
- Project management of mHealth projects to improve systems of care and human resources performance: mobile job aids and checklists, direct-to-patient systems for reminders and patient-facility communication, and data collection, for particular projects or for larger scale household surveying
- Studying the cost-effectiveness of mHealth interventions
- Assessing the effects of mHealth on the health system



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**About FHI 360:** FHI 360 is a nonprofit human development organization dedicated to improving lives in lasting ways by advancing integrated, locally driven solutions. Our staff includes experts in health, education, nutrition, environment, economic development, civil society, gender, youth, research and technology — creating a unique mix of capabilities to address today's interrelated development challenges. FHI 360 serves more than 60 countries, all 50 U.S. states and all U.S. territories.