Mobile Phones & Behavior Change: Good Practices for mHealth Interventions

MIT D-Lab & the MIT Practical Impact Alliance 2016

MIT Practical Impact Alliance

Led by MIT D-Lab, the Practical Impact Alliance is a membership group that brings together leaders from diverse organizations (including corporations, nongovernmental organizations, government agencies and social ventures) with aligned missions to share learning, collaborate, and develop best practices.

Through working groups, a field-based co-design summit, an annual conference, and MIT student engagement opportunities, PIA member organizations increase their individual and collective impact all while leveraging and supporting the work of MIT programs focusing on global poverty alleviation.

Image courtesy of Johnson & Johnson Global Community

The MIT Practical Impact Alliance identifies good practices for mHealth interventions

With the proliferation of mobile phones across the world, many organizations have been leading programs that use the mobile device as a platform for sharing information, driving behavior change, and tracking data on their beneficiaries and customers. The focus of these programs has been primarily on maternal and child health, but some have expanded to use mobile platforms in other areas of health, as well as for agricultural development, education, and financial inclusion.

Although there have been reported cases of success in this field, these interventions tend to be complex, and it can be challenging to reach significant scale. There is still room for innovation, especially related to scalable solutions and programs.

In 2015, with a goal of characterizing effective design, testing, and implementation of mobile health (mHealth) programs, members of the MIT Practical Impact Alliance (PIA) formed the Mobile Phones and Behavior Change Working Group to share and analyze case studies from a variety of organizations.

Overview of this guide

The learnings and best practices presented by members of the PIA Mobile Phones and Behavior Change Working Group informed the development of this guide and the group's insights and examples have been incorporated throughout.

With a focus on maternal and child health, this guide includes a list of good practices for organizations developing mHealth platforms and highlights key considerations for program design including:

- Message content
- Delivery model
- Payment scheme
- Data management system

It also provides insights into good practices for testing and implementing mobile phone and behavior change programs.

Organizations contributing case studies and to the writing of this guide include the social enterprise Dimagi, nongovernmental organizations including the Grameen Foundation and World Vision, and multinational corporations including Johnson & Johnson (in collaboration with BabyCenter, a member of the Johnson & Johnson family of companies).
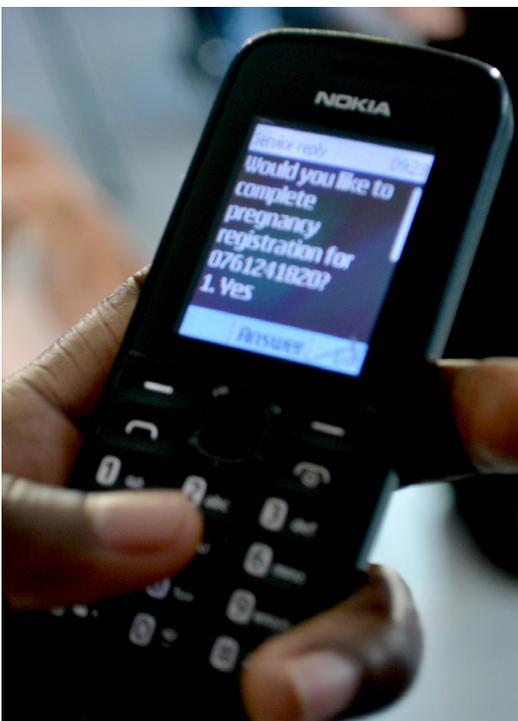
Case Introductions

Founded in 2002, Dimagi is a software social enterprise that develops technologies to improve service delivery in underserved communities. Dimagi's primary product is CommCare, an "open source mobile platform designed for anyone to design, deploy, and use mobile applications for health information and tracking." The target users include "frontline workers and supervisors in low-resource settings and frontline programs managing community-based projects." Through the platform, health workers can manage cases, provide key information, collect data, and counsel beneficiaries. This system also allows for worker performance monitoring. Over 50 publications have demonstrated CommCare's positive impact on Field Level Worker performance and client behaviors and outcomes. Working with government ministries, organizations like the Bill & Melinda Gates Foundation, companies like Danone and Novartis, and universities like MIT, Dimagi has deployed this platform in more than 500 projects in health, agriculture and education, in over 50 countries.

World Vision, founded in 1950, is an international Christian humanitarian organization that works with children and their families to lift themselves out of poverty. Their programs focus on education, disaster relief, food and agriculture, and child protection and health, among other areas. For over eight years, World Vision has advanced mHealth as a health and community systems strengthening tool with the intent to boost health and nutrition outcomes for pregnant women, mothers, and children under five years of age. World Vision has invested in the development of a common set of applications built within the Motech Suite/CommCare. This has been made possible through a collaboration with Dimagi, Grameen Foundation, and the Bill & Melinda Gates Foundation. The common solutions are then contextualized in close consultation with Ministry of Health (MoH) counterparts and users at the national and local levels. As of end-2015, the World Vision mHealth portfolio included active deployments supporting 6,200 community health workers (CHWs) and health facility staff using the solution and over 450,000 beneficiaries across 16 countries in Africa, South Asia, and Southeast Asia.

Grameen Foundation was founded in 1997 "to enable the poor, especially women, to create a world without hunger and poverty." With the correct tools and support, Grameen believes that everyone is capable of improving their own lives. The foundation provides support through health, agriculture and financial services. One of the services Grameen provides is health information – including reminders – through the Motech platform. Working with BBC Media Action, the Bill & Melinda Gates Foundation, Johnson & Johnson, USAID, Care, World Health Partners, the Ghana Health Service, and the Government of Bihar, among others, Grameen has been using the Motech platform to share resources on maternal and child health and to enable frontline health workers to recognize symptoms, manage patient data, and improve patient adherence. With its partners, Grameen Foundation has implemented programs in Ghana, India, and Nigeria.

Johnson & Johnson, founded in 1886, is a multinational health care company that provides consumer products, prescription products and medical devices. In 2008, as part of their health programming, Johnson & Johnson started Text 4 Baby in the U.S. The platform sent messages to pregnant and new mothers about maternal and child health. Following this experience, Johnson & Johnson made a commitment under Every Woman, Every Child to begin mobile messaging programs in 6 countries: India, Bangladesh, South Africa, China, Nigeria and Mexico. To meet this commitment, Johnson & Johnson created a public private partnership with USAID, UN Foundation and BabyCenter to establish the Mobile Alliance for Maternal Action (MAMA). MAMA implemented programs through local partners in Bangladesh, India, South Africa, and Nigeria and reached over two million beneficiaries. Further programs have been launched with Johnson & Johnson support in China and Mexico.

Good Practices for mHealth Programs

PRE-DESIGN

The first step in developing an mHealth program is to clearly articulate the goals and desired outcomes of the intervention, including a coherent theory of change.

- What is your organization trying to achieve with the program?
- What are your goals?
- What behavior(s) is your entity trying to change?
- What are the desired outcomes?

It is important to work with your partners, collaborators, and users to determine the responses to these questions. Once they are clear and stakeholders have agreed, you can then begin to think about the design, testing, and implementation steps.

DESIGN

1. Message Content

Identify the end-users and beneficiaries

Interacting with users such as expectant or new mothers and understanding their needs should be at the heart of the intervention according to World Vision, Dimagi, Grameen Foundation, and Johnson & Johnson. This is one of the most important aspects to consider at the start and throughout the program planning process and implementation.

Identify the household influencers & decision-makers

It is important to not only understand the users and beneficiaries, but also others who could influence them. There may be other household influencers or decision-makers, including a mother-in-law or spouse, who could affect the mother's decision or ultimately decide for her. Therefore, it is important to understand the influencers and their triggers in order to be able to target messages to them as well. For instance, husbands may need to receive a message about the importance of taking their pregnant wives for their next medical appointment.

Determine the behavior change triggers for beneficiaries & influencers

Understanding the challenges that end-users, influencers, and decision-makers want to solve and the triggers that will motivate them to resolve those challenges is essential. Beneficiaries are more likely to change their behaviors if the problems are apparent and they require action. For instance, if a mother finds out that she has gestational diabetes, which is associated with a number of risks including complications during child birth, low blood sugar for the baby, and jaundice, among other issues, then she may be much more likely to eat healthier, cut down on carbohydrates and sugary foods and exercise more rather than eating healthy just because she knows it is a good practice.

Image courtesy of Dimagi

It is important to understand the mother's concerns and figure out what information and action, and which supporting family members will enable her to change her behavior. Although some of this data can be ascertained by interacting with the mothers, some of this information has already been well-documented through organizations like BabyCenter and through ministries of health.

Consult literature, behavior change theory & experts to determine message content

Message content on maternal health can be aggregated from several different sources. Referencing evidence, previous studies, behavior change theory, and key informants or experts will lead to more effective content. For example, Grameen Foundation worked with BabyCenter and the Ministry of Health in India to determine which content should be delivered and when. The information should be tied directly to the program theory of change and outcomes, which should be delineated in the pre-design phase.

Target & time the content based on the stage of the pregnancy

The information should be timed, sequenced and delivered based on the stage of pregnancy. For instance, Johnson & Johnson succeeded in delivering messages to expectant mothers about the baby kicking at the time when most pregnant women begin to experience this. Through the platform, Johnson & Johnson also shares information regarding preparation for labor, nutrition, exclusive breastfeeding, and postpartum depression (Peter et al, 2016). Similarly, World Vision's Timed & Targeted Counseling (ttC) programming model defines key messages, milestones and interventions at all stages of pregnancy and newborn child care and delivers them at the correct time.

Make the content accessible & relevant by localizing message

Consider important cultural issues such as language and the age and gender of those delivering program messages. Grameen Foundation assembled information from BabyCenter and India's Ministry of Health and adapted the information and delivery mechanisms based on the local customs and languages. For example, in India, women reported wanting to hear from women, specifically older women who have an accent, sound intelligent, and use some slang in their vocabulary. However, even though on the whole women prefer to hear from other women, some of the messages were also from men and delivered to men in an effort to involve the husbands in the pregnancy and encourage the men to take the women to their doctors' appointments.

Sometimes the content related to health issues can be intimidating or scary, so incorporating fun and somewhat surprising messages into the overall program will help to connect with the user emotionally. Johnson & Johnson, for instance, sends fun messages to pregnant women indicating that the baby is the size of one of the local varieties of fruit or the size of the mother's body part such as a thumb nail.

2. Delivery Model

Leverage trusted local partnerships to deliver content

Trusted relationships with users are key to unlocking needs and improving the success of technology adoption and uptake. Working closely with a local partner who has strong relationships with the program participants is critical. Organizations delivering behavior change programs may consider providing other services to demonstrate that they will have a continuous presence in the community and will deliver the services promised. In the case of organizations like World Vision, which has had local offices and staff present for decades in many countries, a local presence and trust has been established, and can be enhanced through shared planning with the community and local government toward scale and sustainability.

Image courtesy of Rich Fletcher/MIT D-Lab

Compare cost & effectiveness of each delivery mechanism

There are a variety of mechanisms for delivering the content including directly to the patient or through a frontline health worker.

Directly to the patient: Women receive information weekly through their mobile phones about their due date, stage of pregnancy, and health care during pregnancy. This model can be less expensive because it does not require the frontline workers to interface with the patient. However, patients may not receive, understand, or trust the messages directly from their phones and the information can be one-dimensional, which has the potential to make the program less effective compared to interactions with frontline workers.

Directly to the frontline worker: Frontline workers are trained on good pregnancy health practices through in-person workshops or via Interactive Voice Response (IVR) systems on their cell phones. Health workers then share the information with pregnant women. This program can be more expensive, as it requires additional training and frontline worker time, but it builds the long-term capacity of health care workers. Patients are more likely to trust information they receive from a knowledgeable, trusted intermediary in the community.

To the patient through the frontline health worker: The frontline worker can also play information and reminders for patients using the IVR system. Patients interact with the health worker, but they also receive the information from a centrally produced, authoritative source, which can reinforce the credibility of the health worker, as the information is coming from a legitimate source. The frontline workers can access additional content based on the needs of the patient. This does not require a lot of extra training, but the frontline workers may not be able to answer questions as well because they have not received in-depth training. Like the model above, patients are more likely to trust the information if the frontline health worker is delivering the content.

Many of the organizations have also found it effective to set up help desks, so that the users and beneficiaries can ask additional questions and provide valuable feedback on the programs.

Content should support, not replace interpersonal communication

Although the messages provide valuable information, they should not replace interactions with frontline health workers. World Vision routinely faces the challenge of boosting the capability of community health workers to effectively counsel women to initiate and sustain new behaviors. The behavior change methodology used in their ttC program ensures that current practices and resources are assessed, and a negotiated action is reached through dialogue with women and mothers with the collaboration of family decision makers. When complementing the mHealth component with individualized counseling, health messages were carefully crafted to be played back during counseling sessions and help reinforce key information.

Image courtesy of Dimagi

Select the delivery mechanism after assessing literacy levels

Depending on the literacy levels, Short Message Service (SMS) or IVR may be more appropriate. For instance, if most of the population is illiterate, then IVR may be more fitting. Assess literacy levels in advance to determine which delivery mechanism is most appropriate, so that the end-users will potentially understand the messages. It is also important to test for comprehension of the content in the field. In a program at Grameen Foundation, women can receive messages through SMS or IVR, but primarily due to low literacy rates, nearly 100 percent of the women preferred to receive information through voice messages in some of their programs.

Determine length & frequency of messages

Evidence has shown that the messages delivered over the course of six months tend to be more effective. One evaluation of a Johnson & Johnson program in Bangladesh demonstrated that the message needed to be delivered for six months before maternal knowledge and behavior changes occurred. Programs that run for less than six months can also be effective, but require high levels of user engagement including listening carefully to all of the messages, which is not always feasible (Chowdhury, 2015).

Many of the organizations in the PIA working group agreed that weekly or bi-weekly voice messages were effective. One study demonstrated that weekly, rather than daily, reminders were effective in improving adherence, but that a long message including words of encouragement was no more effective than a short message. (Pop-Eleches et al., 2013).

Evaluate phone ownership & usage patterns for pregnant women

It is important to assess phone ownership and access for women in the program area. In the case of women who have access to a shared phone, message delivery is possible and the success of reaching the targeted women can be increased by creating a special ringtone for women and calling at a time of day when a woman is most likely to have access to the phone. Women can also select the call time. This helps to increase the likelihood that women will receive the messages and can do so in private if required. Johnson & Johnson found this to be effective. Community health care workers can then do follow-up visits and confirm whether or not the expectant mother received the message.

Consider using an affordable platform that can be customized

A platform that is customizable to the organization's needs, but is not cost prohibitive, is ideal. Many of the PIA working group members used an existing platform such as CommCare, which is run by Dimagi, and then tailored the content and the user interface to meet the needs of the user. CommCare is an open source, customizable platform for delivering information and tracking client information. According to Dimagi, "CommCare is the only platform for frontline workers that… is specialized for low-literate users, runs on Java and Android phones, runs offline, integrates SMS for performance improvement, and has an application builder designed for non-programmers." Additional platform options are available including RapidPro and Frontline SMS and others.

3. Payment Scheme

Consider ability & willingness to pay

There are a variety of payment options such as providing the services free of charge, or having users pay in part or in full. Most of the cases analyzed were found to have created programs that were completely free of charge or heavily subsidized. Governments or NGOs may contribute substantially to the cost of development and delivery. For instance, NGOs may cover the cost through a grant they have received. The benefit of free programs is that the barriers to participation are lower. However, that means that other entities need to raise funds to continue the program. If the program is generating enough value, then users may be willing to pay for it in the future. However, even a small registration fee has become a large barrier to uptake in some cases. The solution depends on the context, the value generated for the parties involved, and the customers' willingness to pay.

Many of the working group members provided the services for free or for a low fee, using grant funding to cover the remaining costs. In Grameen Foundation's experience, free is better, as users are more likely to participate if the service if free. In partnership with others,

Johnson & Johnson has tried a variety of payment schemes. In one program, Johnson & Johnson contributed funding to a Bangladeshi organization called dnet to set up a tiered system in Bangladesh, where 20 percent of people receive the content for free and others pay a nominal fee. In South Africa, the SMS messages delivered under the MAMA program were free, but registration cost $.06. This small registration free turned out to be a huge barrier to uptake, as mothers carried no airtime on their phones. Ultimately, Johnson & Johnson decided to offer the service for free. In India, the program is also available free of charge.

It can be helpful to partner with other entities to cover program costs. Grameen Foundation has worked with other organizations to ensure that the services are free to beneficiaries: in Ghana, the Ministry of Health is supporting the program because the telecommunications companies were not able to provide a discount. In Nigeria, the telecommunications companies are working with Grameen Foundation to cover the small fees for the mHealth messages.
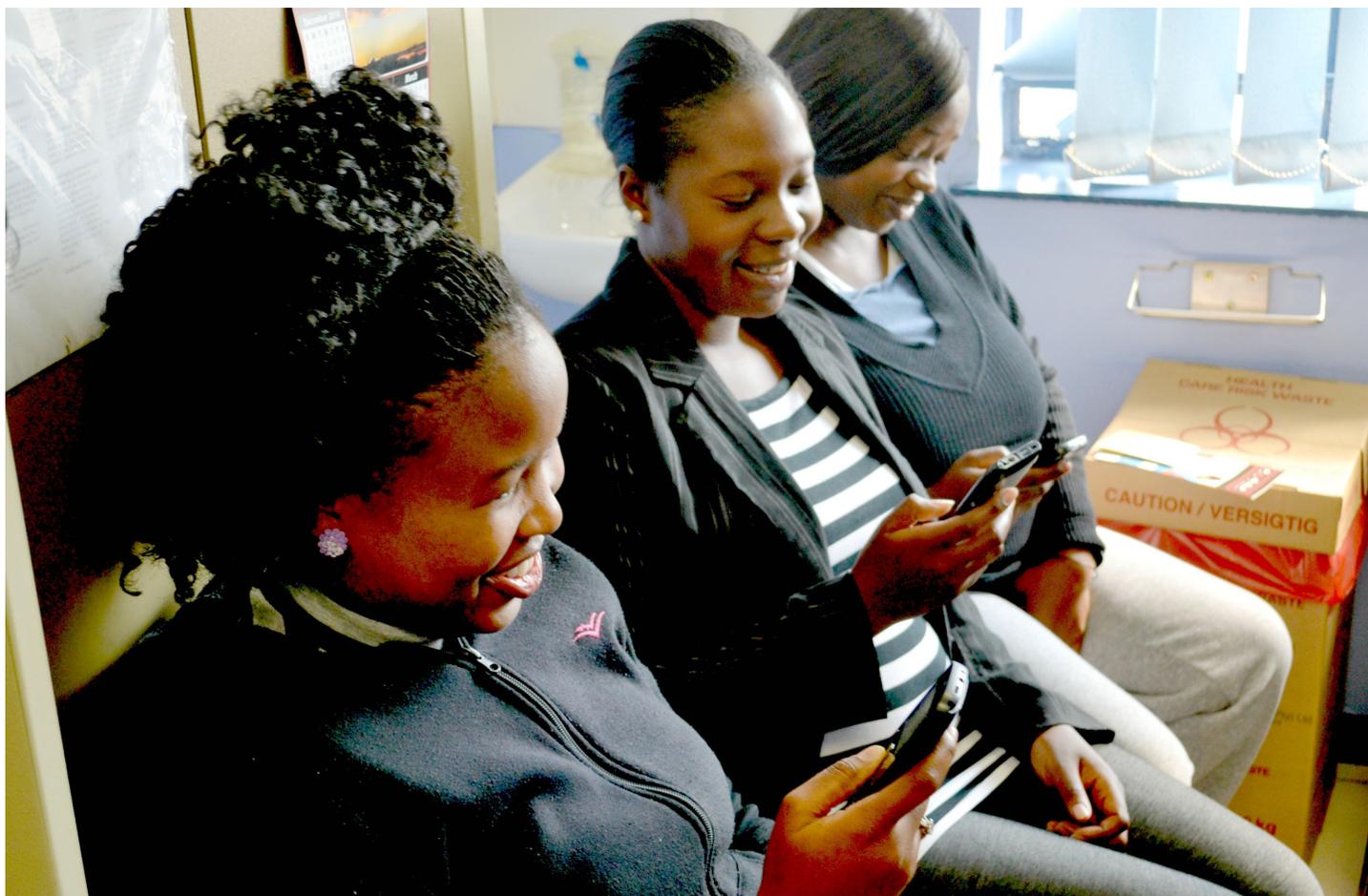

Image courtesy of Johnson & Johnson Global Community Impact

4. Data Management

Consider cost & accuracy when selecting registration mechanism

According to Johnson & Johnson, self-registration or registering using the phone and mobile application without help from the community health care worker can be powerful, as women can access information themselves and it is less expensive than assisted registration. However, it may be hard to tell whether the user is pregnant and who has registered if the user has not registered properly or has provided incorrect information. Thus, the data may not be as accurate or reliable. Facilitated registration can produce more accurate data, but it is often more expensive to engage a community health worker in registration, as she has to be trained and sit with the patient to complete the registration. Ultimately, cost, accuracy, and local context must be considered in order to determine which system is most appropriate.

Provide users with the opportunity to change status in program

Think about how women can change or opt out of a program. For instance, they may want to stop receiving messages if they miscarry. Johnson & Johnson allows women to opt out easily. They also provide information on pregnancy loss.

Protect the identities & data of beneficiaries

It is incredibly important to protect the identities and data of the end-users. Dimagi has taken many steps to address this issue including encrypting the data collected and transmitted through the mobile platform, restricting privileges and access to data through secure logins, storing data on secure servers, and creating different options to download and share de-identified data.

TEST

Test the content & user interface with beneficiaries

Once the program has been developed, it is essential to test both content and platform with end-users to make sure the messaging is relevant and understandable and the interface easy to use. Grameen Foundation, World Vision, Dimagi and Johnson & Johnson have spent a lot of time adapting the platform interface and content based on user interaction and feedback.

Learn & adapt quickly based on testing

Test the program and create opportunities to learn quickly from pilot programs. An organization can provide a sample prototype or diagram and obtain feedback from end-users. Johnson & Johnson has found it effective to conduct shorter, more informal pilots. Dimagi is also a big proponent of conducting early, rapid field testing. World Vision iterates both global and local applications as many times as necessary to ensure they suit the context in the field and are acceptable to the users and beneficiaries.

Measure whether the program is effective

Because mobile-based interventions can scale quickly, it is critical to ensure that there are no negative unintended outcomes of the intervention before rolling out a major program. Thus, it is important to have a monitoring and evaluation system in place from the beginning of the project.

There is some evidence that mobile phone messaging interventions are providing benefits such as improved compliance with scheduled follow-up appointments (Chen et al., 2008; da Costa et al., 2010; Leong et al., 2006; Liew et al., 2009; Prasad & Anand, 2012) and improved adherence to drug treatments (Pop-Eleches et al., 2013). However, the evidence of the effectiveness of mHealth interventions is limited and somewhat mixed. The context and ecosystem matter a lot when implementing mHealth activities, so contextualized and rigorous evaluations are needed to prove effectiveness in each case.

Some organizations have started to develop frameworks for assessing the contribution of mHealth to achieving health outcomes. World Vision, for example, has developed a standard set of basic monitoring and evaluation tools to enable projects to track this contribution over time.

IMPLEMENT

Evaluate capacity needed to run the program effectively

It is critical to make sure that the implementing organization, their partners, and the often volunteer FLW/CHWs, have the capacity needed to run the program. This includes having an information communication technology (ICT) specialist or someone who can provide platform support, someone who can plan strategically and negotiate with the government, someone who can fundraise, a researcher, a content developer, and staff who understand and can interface with the platform. It is important to identify specific roles and responsibilities for each team members. Because it is unlikely that one organization would have the skills to launch an mHealth program on its own, many members of an mHealth program team may be brought in on a contract for development and implementation. It is helpful to map out the partner capabilities and determine where capacity is needed. In some cases, if there are gaps, organizations may collaborate with others to expand capacity and expertise or build the capacity of the local partners. For example, Dimagi has worked directly with organizations like Grameen Foundation and World Vision to provide additional tech support and co-facilitate workshops that provide hands-on training to users.

Partner with others to help reach scale & sustainability

In order to reach scale, partnerships are often necessary. World Vision has collaborated with implementers, ministries of health, national telecommunications regulators, technology providers, funders, and multinational organizations. World Vision has also created a network of academic and research programs, multilaterals, NGOs, private sector businesses, foundations, and national governments, as well as a regional steering committee for some of their programs to help oversee implementation. They have found that it necessary to work with all of the players to develop a business model that makes sense. It is important to consider different perspectives, and to identify which components of the program create value for each stakeholder. It is also necessary to align expectations and goals and negotiate partnering agreements to work toward collective impact. World Vision is currently compiling these practices into a set of defined competencies that are intended to improve the scaling-potential of more of its projects.

Integrate the program with the current health ecosystem

In order to scale mHealth programs, it is often necessary to integrate with the larger health ecosystem and work with the ministries of health from the beginning to get buy-in and reach customers that an NGO or social enterprise might not otherwise be able to reach. In Dimagi's experience, scale is about more than increasing the number of frontline workers using mHealth tools. It is also tied to integrating an mHealth program into the overall health system – including with other ministries of health, NGOs, logistics and supply chains, and ensuring that frontline workers have access to the necessary training, supervision, and real-time monitoring to improve performance. To reach scale, one needs horizontal user and program expansion as well as vertical expansion within the ministries of health. This means engaging the ministries from the beginning of the program and making sure that the mHealth program fits in with their activities. According to Dimagi, this leads to better control through systems integration and increased program effectiveness.

World Vision has also strongly emphasized the importance of aligning with government strategy, policies and architecture, as well as integrating within the existing health and digital systems.

Johnson & Johnson has also found it essential to engage with government leaders in health. In South Africa, many components of the original MAMA South Africa program (technology, content, and partnerships) were adapted by the South African National Department of Health to create a program called MomConnect. The Department of Health set up the program and provided training, leadership and direction to a consortium of multisector partners. Two years after the launch of MomConnect, the program has reached one million users, representing 50 percent of all pregnant women nationwide during this timeframe. The MomConnect program is currently active in 95 percent of public health facilities. Additionally, over 13,000 nurses have been registered to an extension program called NurseConnect that targets midwives and nurses.

Acknowledgments