

Scaling mHealth for Community-Based Health Information Systems

Lessons and Best Practices



USAID
FROM THE AMERICAN PEOPLE



Acknowledgments

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Introduction

Moving toward mobile health for community data



Photo: Liz Nerod

Increasingly, community-based health programs are asked to collect data that are reported to project and national health information systems (HIS) so that projects and governments can use them to inform decision making.

To meet this request, community-based programs are working to develop mobile health (mHealth) solutions to help community health workers (CHWs) collect data, receive timely feedback to improve data quality, use data, and, ultimately, ease the transfer of community data into the health management information system (HMIS).

Mobile health solutions have become more available to community-based programs as access to low-cost technology has expanded and the costs of Internet access have decreased. However, despite almost two decades since the introduction of mHealth, few programs have managed to successfully scale and sustain mHealth solutions.

Introduction

Many documented small-scale digital health interventions exist, as pointed out in PATH's report, *The Journey to Scale*.¹ But despite a high degree of market penetration, informatics companies say that digital devices are not as widely used for health services as might be expected.

Possible reasons for the lack of sustainable mHealth interventions are a general lack of resources, training, and support for long-term sustainability.

Can mHealth projects be scaled to effectively manage community health information and improve data use?

To answer this question, MEASURE Evaluation, funded by the United States Agency for International Development (USAID), looked at two mHealth implementations that had moved beyond the pilot phase.

¹ Source: https://www.path.org/publications/files/TS_dhs_journey_to_scale.pdf

Introduction

How did we select our cases?

We scanned the Internet and spoke with community health and mHealth stakeholders to develop a matrix of mHealth solutions that support monitoring and evaluation (M&E) of HIV; reproductive, maternal, and child health (RMCH); and Ebola. Next, we narrowed our list to mHealth organizations that appeared to have a wide breadth of experience and had gone beyond pilot. Then we reached out to them again, to confirm the scope of their mHealth projects and their willingness to participate in the case study.

Our final selections were the partnership of **Medic Mobile** with **Living Goods**, in Uganda, and the partnership of **Dimagi** with **mothers2mothers (m2m)**, in South Africa.

Introduction

Here's how we implemented the case studies

We interviewed informants at the technology companies:

- **Medic Mobile**, San Francisco, CA, USA, and Nairobi, Kenya
- **Dimagi**, Cape Town, South Africa

and key informants at the implementing partner country offices:

- **Living Goods**, Kampala, Uganda
- **m2m**, Cape Town, South Africa.

We observed CHWs and their supervisors during trainings and while they used the mobile devices and then interviewed a purposeful sample.

Introduction

Who did we talk to?

We conducted informant interviews with the following groups:

Technology companies



- Senior managers
- Finance staff
- Project managers
- Designers
- Software developers

- Senior managers
- Finance staff
- M&E staff
- Technical program advisors
- Information technology staff
- Office branch and facility staff
- Community health workers

Introduction

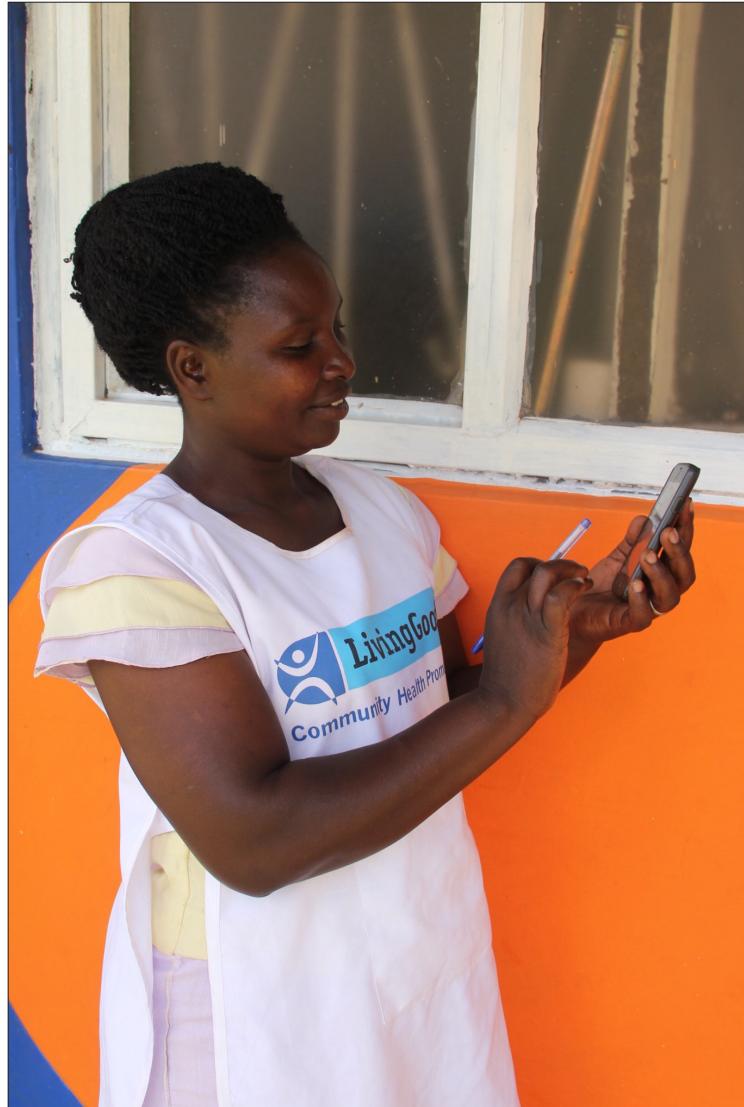
What did we discuss?

Successes and challenges encountered in designing and implementing mHealth programs:

- What considerations for scale were incorporated during the design and planning stages?
- What training was provided on using the system?
- What partnerships are in place to help with sustainability and scaling?
- What other information systems are connected to this system: DHIS 2, DATIM, or another HMIS system?
- What M&E data were used to inform the decision of whether to scale up the program?
- Are there potential cost savings or efficiencies that could be realized by scaling up the system?
- What are the key lessons learned and best practices for taking a community health information system to scale?

Adapted from World Health Organization (WHO). (2015). *The mHealth assessment and planning for scale toolkit*. Geneva, Switzerland: WHO. Retrieved from <http://www.who.int/reproductivehealth/topics/mhealth/maps-toolkit/en/>

Case Introductions



Medic Mobile and Living Goods

Living Goods is using a **Medic Mobile** application to facilitate care coordination—CHPs use it to diagnosis, distribute medicine, and provide needed health information to clients.

Case Introductions

Medic Mobile

Medic Mobile is a nonprofit technology company with offices in Kenya, Nepal, and the United States. It was founded in 2010 to support CHWs through mobile- and web-based tools. It has worked with more than 12,000 health workers in 20 countries. **Medic Mobile**'s goal is to improve health in hard-to-reach communities, by designing, building, and supporting open-source software for health workers and health systems. Its in-house programmers customize their open-source application for specific projects, though they are prototyping a standard deployment package for pregnancy, postnatal care, and immunization.

Since 2010, **Medic Mobile** has cultivated a human-centered design practice, introducing the approach to dozens of health systems-strengthening partners and building new models of care delivery. **Medic Mobile**'s technologies can link CHWs with facility staff to improve the continuum of care. The platform can schedule appointments and track the CHW performance and allows CHWs to alert clinic staff about potential client danger signs, notify clinics of missed appointments, and track disease burden.



Case Introductions

Living Goods

Living Goods is a nonprofit organization based in San Francisco, CA, USA. It began in 2007 with a healthcare program in Uganda. Community health promoters (CHPs) go door-to-door to support pregnant women, educating families about healthy practices, diagnosing and treating sick children, and selling health products such as drugs for artemisinin-based combination therapy (ACT) for malaria, oral rehydration salts, clean water filters, and fortified food. **Living Goods** has since expanded its programs to Kenya, Myanmar, and Zambia.

In Uganda, **Living Goods** has 17 branches that support 1,700 CHPs to provide health services in their communities. Their supervisors work in branch offices, where they provide in-service training, manage commodities, and conduct supervisory field visits. Its entrepreneurial model is based on the collection of commodities and performance data in a mobile system. The system displays these data on dashboards to support decision making at all levels.



Case Introductions



Dimagi and mothers2mothers

mothers2mothers is using **Dimagi** applications to track patients who miss clinic appointments and to enhance case management and health education for households.

Case Introductions

Dimagi

Dimagi is a benefit corporation—a term denoting a business focused on solving social and environmental problems. It is based in Cambridge, MA, USA, and was founded in 2002 to provide mobile tools to frontline health workers in low-resource settings. Its open-source, mobile data collection platform—CommCare—enables the development of custom applications to collect information, support workflows, and provide data for decision making.

Dimagi has experience in implementation and capacity building with more than 500 organizations in more than 50 countries. **Dimagi** provides clients with tools to create cost-effective and scalable mobile data management systems, understand costs to sustain a solution, and assess current systems.



Case Introductions

mothers2mothers

Also called **m2m**, this nonprofit organization has programs in Kenya, Lesotho, Malawi, Mozambique, South Africa, Swaziland, Uganda, and Zambia. Its mission is to improve maternal health. The program trains, employs, and empowers local mothers living with HIV to serve as frontline healthcare workers to support and educate women to prevent HIV infections and stay healthy.

The peer-to-peer approach links clients of a health facility to “Facility Mentor Mothers,” who help provide care in their communities, reducing the number of patients lost to follow-up and improving patient outcomes. To track and manage patient visits, **m2m** introduced a mobile application to digitize the patient diary used for client follow-up. Facility Mentor Mothers use the application to remind them when a client is due for an appointment and to actively follow up with a client who misses an appointment.



“Community Mentor Mothers” extend services outside a facility, by providing health education and case management at the household level while also serving as a link between the facility and the community. They drive demand and service uptake through household interaction and use the mobile application for case management.

The **m2m** program has been evaluated and proven to reduce the number of infants infected with HIV.

Themes



Our findings provide insight into how two implementing partners used mHealth to improve their case management, data capture, data use, and reporting functions.

These best practices and lessons learned may help others as they develop or strengthen their own mHealth solutions for case management, care coordination, and monitoring and evaluation (M&E).

Learn from the Past

Both implementing partners had experience using mHealth solutions.

Living Goods developed its first application in-house, and **m2m** sought an external vendor. Neither attempt was deemed successful, but both provided lessons for current mHealth endeavors.



Learn from the Past

The mHealth Journey of Living Goods

- 2014: **Living Goods** digitized paper records into three applications built in-house: for immunizations, care for pregnant women, and care for children under five years of age. These were not consistently used by CHPs.
- Late 2014: **Living Goods** brought on **Medic Mobile** to strengthen application analytics.
- 2015: **Medic Mobile** integrated the three applications using human-centered design and developed performance dashboards.

Lesson: It's not always possible to turn a paper tool or registry into a digital tool. To design an effective digital community health system, you must understand project work flows and how the end user works.

Learn from the Past

The mHealth Journey of m2m

- 2009: mHealth experiment
- 2011: Insite Electronic database developed
- 2012: Active client follow-up register
- 2015: Paper-based client appointment diary
- 2015 and 2016: Paper-based client master card
- 2016: Implemented mHealth App 1 and App 2 (CommCare); DHIS 2 reporting database

Lesson: Having a vendor relationship with technology companies does not necessarily yield the best results for developing a community health application. You need a strong partnership with the technology company, so they can understand the needs of the users of the application and the program to deliver the best possible solution.

Integrate mHealth

For mHealth to be sustainable and scalable, it must be integrated not only within the project but also in the organization, so that adequate resources—financial and human—can be channeled to it.



Integrate mHealth

Integration makes resource mobilization part of the program, and mHealth resources become essential rather than optional components.

The **Living Goods** country director for Uganda says the program doesn't have an informatics "component." The mobile application is so embedded that the program would not function without it.

Buy-in from senior leadership is critical to the success of an integrated mHealth application, as are passionate staff whose vision is aligned with that of the organization and who are willing to champion that vision.

mHealth champions helped drive **m2m**'s success with a clear vision of how mHealth would improve M&E and service delivery. High-level leadership provided a supportive environment and resources that gave them the freedom to experiment.

Use Partnerships

Partnerships are essential to mHealth success. Partners may be in service delivery organizations, technology organizations, governments, and donors.

A chief learning was the importance of engaging the right partner—one that understands how the program is implemented and therefore can develop a design intervention that meets the need.



Use Partnerships

Medic Mobile and Living Goods

To aggressively scale and meet its goals, **Living Goods** decided that it needed an external technology partner that could help design with the user in mind and manage data. **Medic Mobile**, with its human-centered design process, provided this capacity.

Dimagi and m2m

Success depended on the continued close relationship between the two organizations throughout the process of design, implementation, and scale-up.

According to a **Dimagi** senior manager, you can take the same technology and implementation team to different partners and have different outcomes, based on the partner's readiness for change and the compatibility of styles.

According to **m2m**, finding this partnership was key, because past partnerships focused too much on technology and too little on understanding the program perspective.

Use Partnerships

Donor partnerships

Dimagi and **Medic Mobile** have benefited from donor partnerships that provided funding for initial research and development to produce a core product that could be adapted based on project needs. This allows them to build off past work in new projects, creating economies of scale.

All four organizations said that donor relationships in support of mHealth helped them succeed.

“Unrestricted funding allowed for development and the opportunity to fail—allowed [us] to be nimble and to invest in the necessary training.”

—**Living Goods** country director

“[You need] a key partnership with one funder that is prepared to take a risk and go to bat for you. [The funder] knows you and has trust in you and knows that if you fail, you did your best.”

—**m2m** senior manager

Use Partnerships

Government partnerships

Government partnerships are important in facilitating mHealth adoption, sustainability, and scale. Whether a technology company has direct engagement with the government (as **Medic Mobile** does) or (like **Dimagi**) relies on its implementing partner, these connections are important in sustaining mHealth interventions.

mHealth systems should fit within the existing government system, or at least be aligned with it, so that community services are linked with the formal health system for scale and sustainability.

For **Living Goods**, Uganda's Ministry of Health gave the go-ahead to implement the mHealth system. Now the ministry looks to **Living Goods** as a partner and has asked them to be part of proposal development teams. The ministry now recognizes private integrated community case management, which is important, because that makes public resources available for it.

m2m is partnering with the National Department of Health in South Africa in two sites in Gauteng Province to test a transfer of new client data from its mHealth system to the ministry's MomConnect system so new **m2m** clients can receive MomConnect messages.

Use Partnerships

Facility partnerships

Both **Living Goods** and **m2m** emphasize the importance of creating linkages to health facilities as a central aspect of a successful program.

The **Living Goods** model links CHPs to a facility in their community through a practicum rotation, in which they learn how to diagnosis malaria, diarrheal disease, and pneumonia. The CHPs can develop strong connections with facility workers, which help to expedite referrals (in fact, often CHP-referred clients go to the front of the line).

The **m2m** Facility Mentor Mothers are in the health facility to support and follow up with clients for prevention of mother-to-child transmission of HIV. In some cases, facility staff rely on Facility Mentor Mothers to access the most updated information on appointments and patients lost to follow-up.

Through Community Mentor Mothers, **m2m** strengthens clients' linkage with health facilities, by referring clients to services and following up on missed appointments.

Design for Users

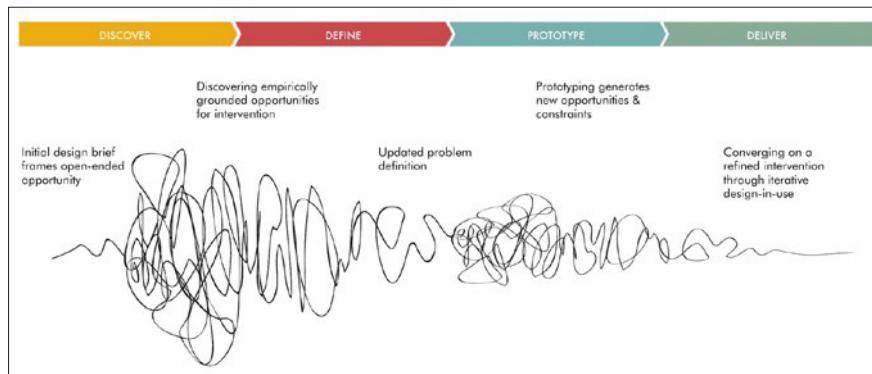


User-centered design is essential to the application development process used by **Medic Mobile** and **Dimagi**. Understanding the project work flow depends on engagement with everyone in the program.

Design for Users

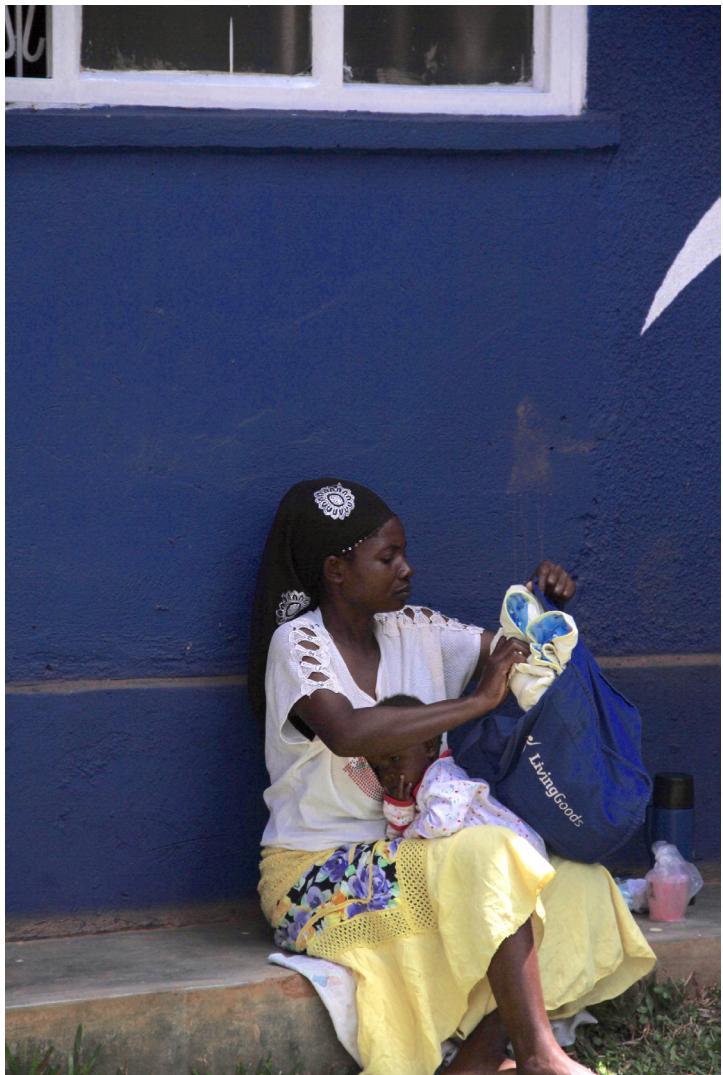
Medic Mobile's approach to human-centered design

Medic Mobile begins with a discovery phase that can last from a couple of weeks to several months, emphasizing an ethnographic style of fieldwork that considers cultural considerations and habits. Regional designers work with CHWs, supervisors, and other project staff to understand how they do their jobs, their work flows, current channels of communication, available infrastructure, and challenges. Insights from this exploratory work define system requirements, enabling software development teams to use the tools they have or build new ones.



Depicted at left is **Medic Mobile**'s design process. As the squiggly line suggests, designing the application is iterative, blending initial implementation and ongoing redesign. Through this process, stakeholders gain a holistic perspective of how the system functions.

Design for Users



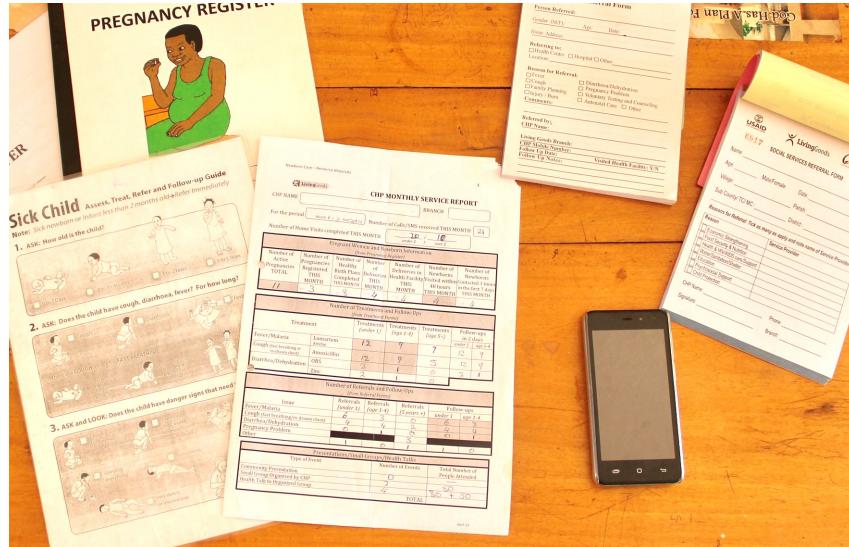
Dimagi's approach to user-centered design

Dimagi considers the individual user and the nature of the organization and its systems. It also employs a maturity model to assess how advanced a program is and identify potential barriers for scaling mHealth within that program.

The project team—which includes a project manager and often a field manager and technical lead—works with the partner organization and its stakeholders to understand work flows and how CHWs interact with clients.

Based on this analysis, an application work flow is designed and a prototype is developed. The prototype is then field-tested and partner feedback is given to refine the application before a working version is deployed.

Keep it simple



The introduction of technology can spark many ideas and open new possibilities in community programs. Although it can be tempting to build an elaborate mHealth application, it's important to keep simplicity and adaptability in mind.

Both the technology companies and the implementing partners learned this lesson. Many CHWs have not used a smartphone before; therefore, the application interface needs to be simple and intuitive.

Simplicity also calls for technology that can be adapted easily—for example, when a work flow or guideline changes.

Keep it simple

Learning from experience in implementing mHealth, the **m2m** team decided to start simple, developing the patient follow-up registry to prevent loss-to-follow-up and then expand into case management and behavior change communication tools.

“*For scaling, you need to look at ease of use and ease of support.*”

—**Living Goods** senior manager

“*[The] system needs to be adaptive or else it would break down pretty quickly. For this project [**Living Goods**], we haven’t gone a month without a change.*”

—**Medic Mobile** designer

Think about scale

When considering scale, understanding where a program is and where it will go is essential to planning for strategic growth.

The definition of scale may vary based on program maturity, country program integration, or depth of services offered.

Therefore, all partners should understand and agree on what scale means for the program and what metrics can be used to assess scale-up milestones.



Think about scale

Medic Mobile plans for scale by linking to the national reporting structure.

Medic Mobile stresses the importance of reporting that conforms to national standards and policies so that, eventually, systems can be used with the government health system.

Medic Mobile and **Living Goods** are working together toward an aggressive scale-up by 2021, which would require them to partner with the government and local nongovernmental organizations (NGOs) to reach their goals.

Think about scale

Dimagi's Maturity Model helps programs consider scale

Dimagi developed a Maturity Model that helps partners develop mHealth roadmaps by:

- Determining how to effectively use mobile tools to improve programs
- Establishing a long-term vision and goals for the mobile system
- Identifying program gaps to improve processes and enhance staff capacity

In this way, Dimagi came to understand what was driving m2m to have a mobile application and became better informed to develop the appropriate solution.

“*It [a maturity model] helps us see where their capacity is and how aspirational they are.*”

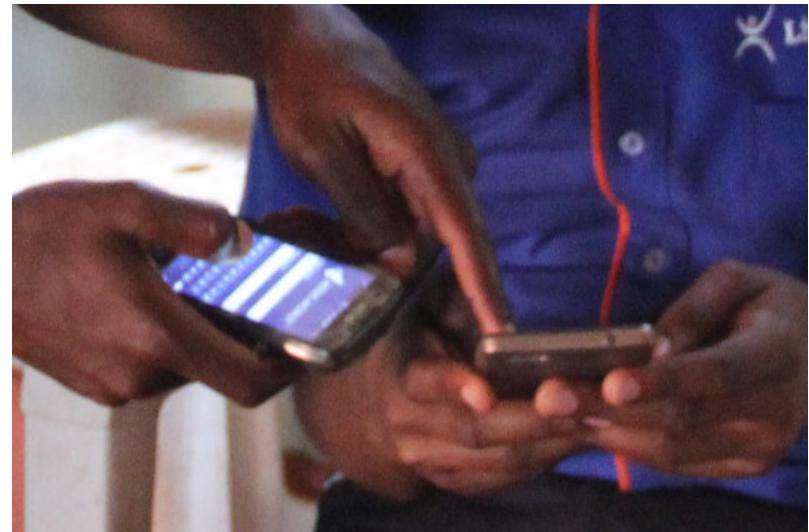
—Dimagi program manager

Have offline options

Reliable Internet access is a challenge in many areas where CHWs work. Applications designed both for online and offline use help overcome connectivity challenges.

If applications can function offline—allowing cases to be stored and even searched on the device—lack of connectivity does not keep CHWs from working.

Later, when CHWs can access the Internet (for example, with EDGE, a low-bandwidth network connection), they can sync their data to the system. The applications tell the CHWs if their syncs were successful so they can troubleshoot as needed.



Have offline options

Real-time data use helps overcome connection challenges and ensures timeliness.

Program performance management monitored through the application is a motivator for health workers to overcome connectivity issues to ensure their data are synced properly and on time.

In some cases, CHWs work offline and wait until the end of the month to sync data. Although this practice may be necessary if connectivity is poor, it delays reporting and data use and can overload the server, increasing sync times.

In the **Living Goods** system, CHPs often work out of branches that have a Wi-Fi connection. They visit the branch regularly to stock health products, attend trainings, and connect and sync their data, if needed.

Define resources

Appropriately resourcing mHealth projects—both financially and with human capacity—is important to sustain them beyond a pilot.



Define resources

Human resources for mHealth

Medic Mobile/Living Goods also invests in regional information technology managers who support the branch offices and provide support for the phones, including troubleshooting issues and updating the software.

Dimagi recommends that each organization they work with appoint a person to coordinate and manage mHealth implementation. This person can provide the link between the technology company and the program, while coordinating user support—at least in the initial phases, until a support model is established.

m2m hired an mHealth coordinator specifically to coordinate its work.

Define resources

Financial resources

Costs of mHealth interventions have three phases:

- Start-up and development
- Continuous costs
- Scale-up costs

MHealth interventions that have achieved some scale incur costs that may not be part of pilot programs. For example, taking on a partner technology company to help design and manage a program will entail additional costs but may also lower costs when the same program is scaled up.

Define resources

Understanding cost drivers of mHealth programs

To estimate the true costs of an mHealth system, you must distinguish between cost drivers at different levels within the health system (i.e., the community, facility, district, and national levels) and the costs or savings that stakeholders (e.g., ministries, NGO partners, CHWs, or other mHealth system users) may realize.

Cost drivers vary depending on the device or hardware required (e.g., a smartphone, a tablet, or a phone with basic features).

Economies of scale can be realized if costs can be incorporated in existing programs, by integrating training, equipment purchasing, and

data services. **m2m** includes digital health in its business development proposals. By doing this, it can spread costs for digital health across all its awarded contracts.

Unsuccessful pilots are prevalent enough to be a significant cost for some organizations and health systems. Acknowledging these costs can help determine appropriate levels of investment in design, training, and operational support.

Both **m2m** and **Living Goods** learned this, having spent considerable resources on unsuccessful mHealth projects prior to partnering with **Dimagi** and **Medic Mobile**.

Define resources

Understanding cost drivers of mHealth programs

Through speaking with technology companies and implementing partners, MEASURE Evaluation has identified eight cost categories for designing and implementing mHealth solutions.

1. Application development: staff, travel, and other direct costs of creating the software, including adding features in later project phases
2. User meetings and feedback: staff, travel, and other meeting costs
3. Equipment: hardware and other nonoffice supplies
4. Trainings: in-person and online for CHWs on using the application
5. Office: rent, shipping, and supplies
6. Scaling: costs to expand an application feature, including customization and expanding capacity for new users
7. Program management: administrative and strategic planning costs
8. Support: maintenance and technical support for application and online resources, including licenses and hosting

Define resources

Understanding cost drivers of mHealth programs

What drives the costs of involving an informatics company and reaching a level of scale?

Start-up and development costs:

- Informatics company labor (local, regional, and international)
- Design with users (user experience [UX] and user interface [UI])
- Design forms and work flows
- Analytics development (i.e., dashboard)
- Product management
- Translation and interpretation of content
- Content adaptation
- Integration of a new application with an existing system
- Curriculum development
- Branch office conversion from paper to digital

Continuous costs

- Partnership development
- Technical support
- Support for application revision, web platform, or dashboard
- Analytics, integration, and data migration
- Regional strategy management
- Governance, government relations, and advocacy

Scale-up costs

- Potential cost savings from unrestricted funding
- Expansion of the package of services offered

Define resources

Understanding cost drivers of mHealth programs

Costs and savings of bringing mHealth to scale

Several cost drivers for bringing mHealth solutions to scale often are either misunderstood or not considered.

For instance, though many may believe that the device cost is the greatest expense, we have found that training is often the main cost for mHealth solutions at some level of scale.

Missing or misunderstood costs drivers are:

- Training and retraining
- Governance, government relations, and advocacy
- Design user experience and interface (UX and UI)
- Analytics development (i.e., dashboard)
- Product management

Potential cost-savings when bringing mHealth interventions to scale:

- Integrated training and workshops
- Decrease in cost of hardware and data services

Train



Training is a main component of successfully integrating mHealth in a community health program.

- CHWs need training not only on using the mobile devices but also on using the application.
- Ongoing follow-up training is needed to reinforce application use and daily data use.

Training is resource-intensive. A commitment to understanding the value and need for training is essential.

When planning and budgeting for CHW training, neither **Living Goods** nor **m2m** ever reduced the frequency of training, because they felt that doing so would seriously compromise program quality.

Rather than reduce training to lower costs, **m2m** chose to reduce scale, by decreasing the number of communities using the application. To realize cost savings, both **m2m** and **Living Goods** integrated specific mHealth training in regular in-service training.

Train

To ensure that each CHW develops capacity, both **Living Goods** and **m2m** provide initial training in addition to routine training.

Both offer support and follow-up for users. The process includes a defined chain of command on whom to ask for support and an electronic help desk and a “WhatsApp” help group.

Living Goods provides CHPs an initial two-week training, which includes focus on the mobile device and the application. Afterward, monthly training focuses on program areas and applications, as needed.

“[It] takes time to train CHPs on how to use the analytics on phones and [train] supervisors on the dashboard, but there is a need to learn how to be actionable.”

—**Living Goods** senior manager

m2m provides three weeks of training, one week of which focuses on the application and tools. Then they provide two in-service trainings per year that also include training on digital tools.

Use data

mHealth systems designed for users with work flows in mind help capture data in real time to meet the information needs of all levels of the system, which leads to increased data use within the program.

- At the community level, CHWs use information on a mobile device to help them plan their day, perform their job, and track their performance against targets.
- Supervisors can use device data to track CHW performance and plan supportive supervision.
- Heads of regional and branch offices can use the information to compare their office to others to see where they may be excelling or falling short.
- Headquarters staff can look across the project to see which offices are performing well or need additional support and track their performance against their global targets.

Use data

But there can be issues with the volume of data.

“With more and more data being available . . . [there is an] issue with not getting data to [subcounty staff] in a [useful] manner. Data is being collected on paper, and these pieces of paper are aggregated and put in DHIS 2, but it is not getting to [the] subcounty in a way they can use it. . . There are no dashboards.”

—**Living Goods** senior manager

Use data

Living Goods: Data use for household follow-up and planning

The **Living Goods** application creates a daily task list for each CHP, based on the outcomes of previous household visits.

According to a **Living Goods** CHP, when they used a paper system, they would forget which clients they had seen and what happened during the visit. They had no way to plan their day or prioritize patients but visited homes in an ad hoc manner. The digital system helps them track their services.

For example, if a CHP diagnoses a child with malaria and dispenses artemisinin-based combination therapy, the application will remind the CHP two days later to visit the household to follow up.

CHP supervisors have dashboards they can review at the branch office to see how their CHPs are performing against targets. This way, they don't have to reach the CHPs to know how they are doing.

Use data

m2m: Real-time data sharing as a solution for loss-to-follow-up

m2m's mHealth system tracks clients who are lost to follow-up through an electronic calendar that notifies Facility Mentor Mothers when clients miss appointments.

The Facility Mentor Mother can then use the mobile device to notify a Community Mentor Mother of the missed visit, which triggers a household visit to investigate why the appointment was missed and set a new appointment time. This information is then relayed to the Facility Mentor Mother.

Use data

Addressing data quality, mHealth also promotes data use

Data collected through the mobile application is often synced after each household visit, or at the end of the day. This makes real-time, or near-real-time, data available to inform decision making.

Application data validation rules require users to complete all data fields, which results in data that are higher-quality and more complete than the data in paper-based reporting systems.

Professionalize

Community-based HIS require strong community health systems. A functioning community health program that institutionalizes and professionalizes the role of the CHW is essential for community mHealth initiatives to be successful.

As seen in both the **m2m** and **Living Goods** programs, the role of the CHW is a foundation within the health system.

“ By professionalizing the CHWs, they can give client solutions. When you give solutions, you are valued.”

—**Living Goods CHP**

“ mHealth and a professionalized CHW workforce allows programs and governments to task shift, by providing CHWs with decision support tools and prompts, so that they can provide frontline services to clients.”

—paraphrased, **Medic Mobile**

Professionalize

CHWs are essential to sustain mHealth programs

Studies have shown that the most impactful community health programs equip CHWs with the skills necessary to diagnose, treat, and prescribe medicine and a supportive system that facilitates their work.

To be successful, CHWs should be part of a larger professional network, with opportunities for continuous learning. They also need tools such as mobile devices with job aids and data-capture interfaces that help them provide better care for their clients.

Professionalize

Professionalization of the CHW workforce also requires proper pay scales to motivate them. Both **Living Goods** and **m2m** have defined systems for compensation, ranging from a percentage of commodities sold to a weekly salary.

Living Goods compensates CHPs through a commission received on sales and an incentive scheme based on their performance.

m2m's Mentor Mothers are employed through the organization and are compensated with a regular salary.

Professionalize

CHWs and mobile solutions

As the role of the CHW is professionalized and as the responsibilities of CHWs increase, these workers say they appreciate the mobile application, and that it has completely changed the way they work.

They say that the application provided them with a “smarter job.” CHWs also perceive that their clients respect them more now that they use the application, because the decision-support information provided with the phone sounds like what had been said at the health center. CHWs not only liked having the phone; they were proud to have it.

“*Phone is my doctor.*

—Living Goods CHP

“*[The] phone has improved our work and made [an] impact. [The] phone allows for daily reporting and they can contact clients and supervisors. [The] phone has made work quicker and more practical.*”

—Living Goods CHP

Professionalize

Living Goods and **m2m** implemented different approaches to ownership of the phone by CHWs, but both approaches led CHWs to value the phones highly.

Living Goods buys the phones but requires CHPs to contribute the equivalent of 8 USD. The CHP is then responsible for the phone and can use it for work and personal needs.

m2m buys the mobile devices and gives them to Mentor Mothers to use while working. Each Mentor Mother has her own phone, which must be left at the office, locked in a safe.

Use devices for services

Often, mobile devices are seen only as a way of digitizing M&E tools.

Though mobile devices do help programs receive more timely M&E data for reporting, that fact does not necessarily improve a program and it may not help CHWs work more effectively.

Living Goods and **m2m** both worked with their technology partners to develop applications that went beyond reporting, with a focus on decision support and performance monitoring tools.

Medic Mobile and **Dimagi's** approach to mHealth design is that the application must facilitate service delivery through case management that standardizes and facilitates the CHWs' work flow. They designed the applications for **Living Goods** and **m2m** to support client interaction while also enabling the collection of appropriate data.

Use devices for services

This approach provided the data needed for M&E reporting as a by-product of improving overall case management.

“*First and foremost, [we must] support mobile to support service delivery. If we do that, we will have relevant information for managers as well as for program monitoring. If we get that right [service delivery support tool], then they will have a ton of high-quality data for short-, medium-, and long-term decision making. If it [the mHealth app] is organized by case or form, we could miss opportunities to provide holistic support.”*

—Medic Mobile CEO

Use devices for services

Performance management

In addition to supporting services as a clinical decision making and case management tool, the application can also provide information on CHW performance, which—coupled with targets—can motivate workers to improve performance.

Supervisors can also view this information to track a CHW's work, allowing them to encourage the CHW to attain targets and recognize when support is needed.

The **Medic Mobile** application links to desktop dashboards that allow supervisors to monitor the performance of CHWs and branch offices.

Dimagi's application provides similar data to populate worker productivity reports. It also offers a supervisor application that allows the supervisor to directly manage CHW performance.

Plan the project

Strong programs with clear processes and defined staff responsibilities are the foundation of a sustainable and scalable mHealth solution.

An application alone cannot fix a program that is not working well and is more likely to highlight problems. With a strong program foundation, the mHealth solution should enhance the program to be more efficient and effective. At the very least, it should not inhibit the program.

When a mobile application provides evidence of an issue with a program, a strong program should be prepared to address it.

For example, in the **m2m** program, if data from the application highlights clients' missed appointments or patients lost to follow-up, the program should take into consideration and ensure that a facility is able to accommodate all clients making return visits. The digital solution is likely to find more lapsed cases than were found with a paper-based system.

Supervise

Sustainable mHealth solutions are helped by a strong system for management and supervision at all levels.

Along with intense performance management, quality assurance must be part of project management to ensure that information collected by CHWs accurately reflects the services being provided in the field.

Quality assurance can be facilitated through data collected in the application and with a random sample of households to verify data.

For example, to ensure high-quality services and data, **Living Goods** randomly calls 5 percent of the households in six branch offices each month to confirm that CHPs visited the household and provided the services recorded.



Conclusion

Participants in this study agreed that mHealth is a powerful tool for scaling up community-based health information systems.

There was a feeling that community-based health information systems would not advance if more programs did not shift to digital case management and care coordination, and that evidence-informed decision making for community programs would be limited.

Implementing partners may use the lessons presented here to help them design and implement their own mHealth solutions and, with these lessons in mind, work toward moving from pilot projects to scaled mHealth solutions.

Scaling mHealth for Community-Based Health Information Systems Lessons and Best Practices



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