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# *TulaSalud*

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***Goldilocks Toolkit***

*Innovations for Poverty Action*

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Right-fit monitoring and evaluation (M&E) systems embody the principles of Credible, Actionable, Responsible, and Transportable, or CART. In the Goldilocks case study series, we examine the M&E systems of several innovative organizations and explore how the CART Principles can work in practice.

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# TulaSalud: Challenges of Measuring Impact for a Mobile Health program

Rapid expansion of mobile technology across developing countries has ushered in the emergence of the “mobile health” sector, or mHealth, which refers to the use of mobile technology in medical care. TulaSalud is an NGO based in Guatemala that implements an mHealth program that aims to improve health services for rural populations. Founded in 2008 with support from the Tula Foundation, TulaSalud operates in close partnership with the Ministry of Health in Alta Verapaz, one of the poorest regions in the country. Alta Verapaz is characterized by chronic malnutrition and high rates of maternal and infant mortality.

TulaSalud uses a mobile application to help community health workers (CHWs) collect patient information and provide basic healthcare services. Health outcomes in Alta Verapaz have improved considerably since TulaSalud introduced the program, but the precise contribution of the mHealth platform to this progress is uncertain.

This case study focuses on the important role of feedback data in designing and implementing an mHealth program that supplements existing healthcare services, and in making changes to improve program implementation.

TulaSalud serves as a good example of a program that uses data to make operational decisions and improve its operations. To build on the current approach, we recommend adding impact evaluations to test how variations in

the platform and training of CHWs improve their performance. The efficacy of practices TulaSalud promotes is documented in medical research, and improving the training of CHWs and their ability to use the system is likely to be a more relevant question for TulaSalud (and less burdensome operationally) than an assessment of the platform on health outcomes.<sup>1</sup>



Photo courtesy of the Tula Foundation

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# *What They Do*

TulaSalud works with Guatemala's Ministry of Health and other partners to provide Community Health Workers (CHWs) with mobile phones and information to improve maternal and child healthcare. TulaSalud's mHealth program aims to improve maternal and child health outcomes by improving the capacity of CHWs and the Ministry of Health's system of care.

The program uses an application called Kawok (Figure 1), running on CommCare's mobile platform, to track medical cases and record health and clinical information in adherence with Ministry of Health guidelines. Kawok also includes culturally appropriate multimedia content, such as images and audio

recordings in local languages, which allows CHWs to provide health advice to individuals and community groups – including in communities where Spanish is not the first language.

Before CHWs join the program, they receive additional medical training and instruction on using the mobile platform. Participating CHWs also receive remote training once a month via TulaSalud's Telemedicine program and attend in-person quarterly trainings led by TulaSalud and the Ministry of Health. They receive a monthly stipend of about \$100 for participating in the program.<sup>2</sup>



■ **FIGURE 1. KAWOK MOBILE APPLICATION**

CHWs deliver health services in door-to-door visits in each community, using mobile phones to access the Kawok platform where they can create medical case records, access information on how to provide basic care, health education and counseling, and monitor pregnancies and malnutrition among children. The mobile phones allow CHWs to call medical experts and discuss best practices with each other, or to request emergency transfer to a clinic or hospital. In addition to facilitating patient care, the platform can provide short audio messages on health issues like pregnancy risk factors and alarm signs, recorded in local languages. CHWs also conduct follow-up visits<sup>3</sup> and can request patient referral to government health centers for services that are beyond their ability to provide.

Since 2012, the number of CHWs participating in the program has surpassed 400, providing coverage to over 900 communities in twelve of nineteen health districts in Alta Verapaz. Kawok is being used to monitor over 8,000 pregnancies per year. TulaSalud is currently working on the third version

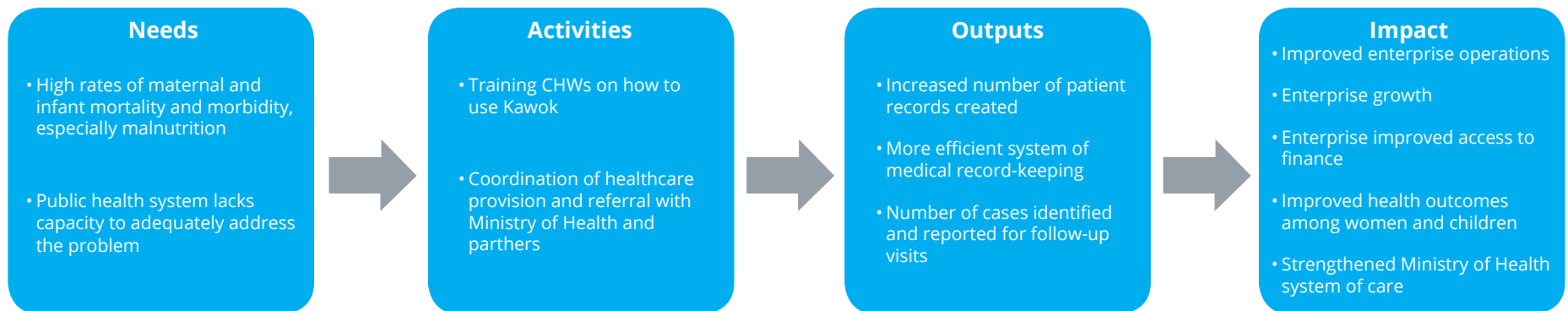
of Kawok, which will include support for monitoring nutritional status,<sup>4</sup> education, and health counseling.

# Theory of Change

In developing countries with a shortage of professional medical staff, CHWs provide basic healthcare services to populations that otherwise might not receive healthcare. TulaSalud aims to increase the capacity of CHWs to reach these populations and improve the quality of services they provide through a mobile tool that gives CHWs access to

information and a more efficient case management system. Faster access to health data allows TulaSalud and its partners to provide more timely and appropriate service to patients. The theory of change diagram (Figure 2) indicates that the program consists of two main activities to reach these goals: training CHWs in how to use Kawok,

and coordinating healthcare provision and referrals with TulaSalud partners over the platform. Immediate outputs include expanded access to healthcare, more efficient record-keeping, and more follow-ups, which should lead to improved health outcomes.



**FIGURE 2. THEORY OF CHANGE\***

\*Organizations use a variety of methods to present their theories of change. To standardize our discussion of these cases, we present our own simplified version of TulaSalud's theory of change here, based on discussions with program staff.

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# Activity Monitoring

The Kawok platform is both an intervention (assists CHWs in delivering services) and a data collection mechanism (creates and tracks patient records) that can report data about program implementation. By replacing paper forms with electronic records, Kawok lowers the cost of data entry and increases its speed, and also reduces the time needed for a response from the medical team.

The health indicators collected in the system are based on Ministry of Health guidelines and reporting requirements, and include:<sup>5</sup>

- Pregnancies detected
- Prenatal and postpartum risk

factors and warning signs

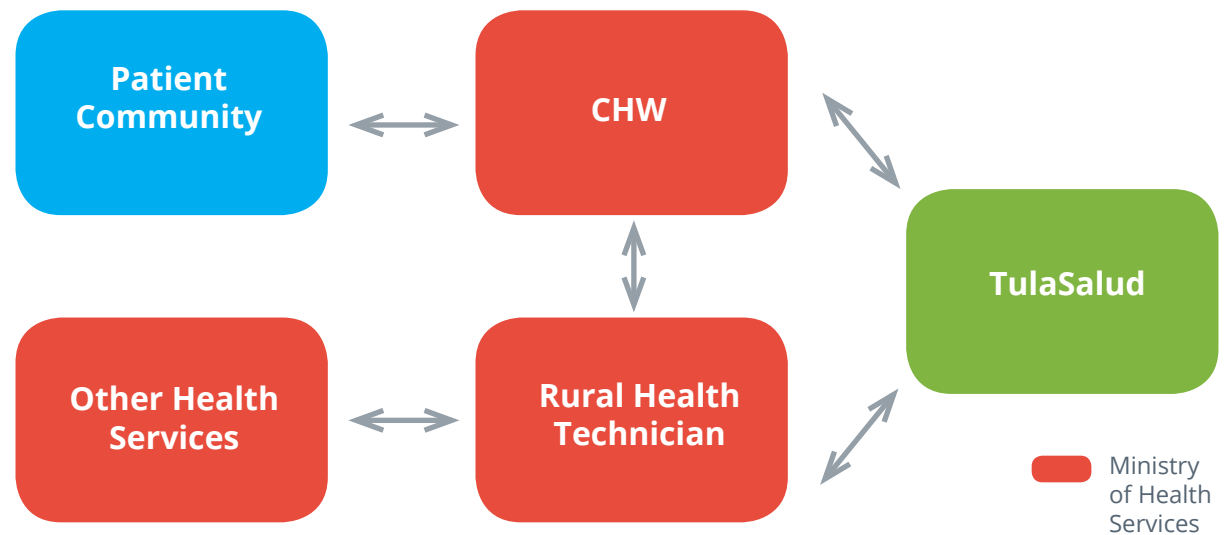
- Pregnancy prenatal care by age group
- Vaccination of pregnant women
- Place where the birth occurred and the type of delivery
- Type of assistance received during childbirth
- Health assessment of the newborns, including any risk factors
- Cases in prenatal care
- Cases registered postpartum
- Neonatal cases registered

Data entered on the mobile phone is uploaded through Kawok to CommCare's web-based platform. Six verifiers and the program coordinator check data quality,

using application-based controls such as logic skips and restricted values. Every day, TulaSalud's program coordinator downloads the dataset into Excel for analysis.

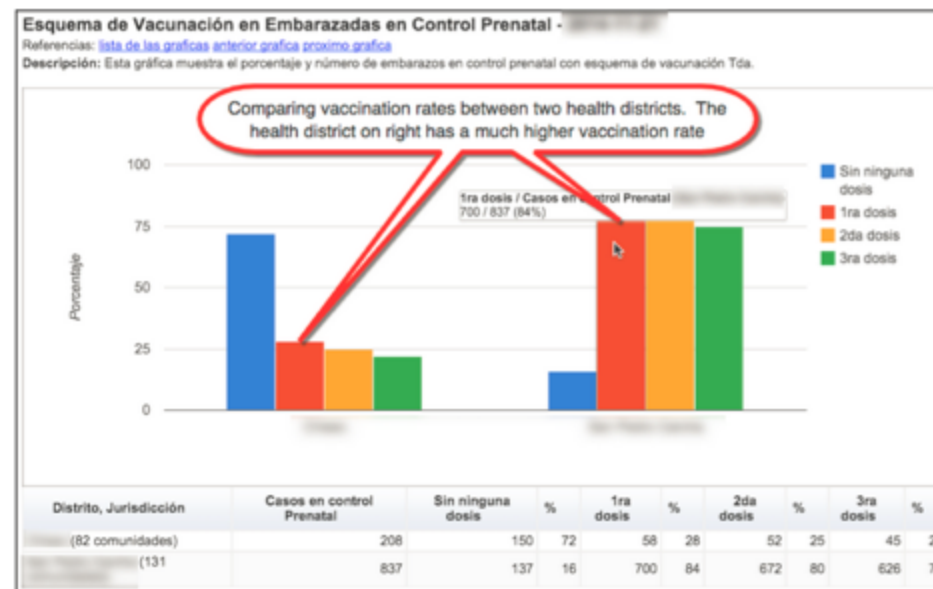
Once TulaSalud staff perform data quality checks, the program coordinator manually classifies each case, based on Ministry of Health criteria, into one of the four categories: red<sup>6</sup> (high-risk case, requiring immediate medical help); orange (high-to-medium-risk, may require close monitoring but not in immediate danger), yellow (medium-to-low risk) and green (low-risk case). These assessments are sent to Rural Health Technicians, who are part of the public healthcare system and are responsible

for monitoring and coordinating the work of CHWs,<sup>7</sup> particularly on high-risk pregnancies and upcoming deliveries. The technicians also assist CHWs with patient referral and transfer for further medical care.<sup>8</sup> TulaSalud staff help the technicians monitor CHWs and coordinate referrals with the Ministry of Health and service providers. Figure 3 illustrates the information flow. In the future, TulaSalud’s technical team hopes to partially automate the classification process to speed up the referral process for high-risk cases.



**FIGURE 3. INFORMATION FLOW**

The Kawok platform provides a secure website that can only be accessed by Ministry of Health officials, relevant partners, and TulaSalud staff. The application includes a dashboard that displays data at the community and district levels, such as vaccination rates and disease outbreaks. The system is designed so that users can view customcharts and maps in real-time for a faster response to immediate needs (Figure 4).



**FIGURE 4. KAWOK DASHBOARD EXAMPLE**



## Using Data to Improve the mHealth System

The Kawok application was not TulaSalud's first experience with mobile data collection. The organization had previously used a different mobile application and platform, but found that it fit poorly with CHW needs. Despite having mobile phones equipped with this earlier platform, CHWs had continued to gather information on paper forms, which they would later enter into the electronic system. They also experienced problems with the application's workflow and general usability.

TulaSalud wanted to ensure that its mobile platform was responsive to CHW needs and easy to use. After switching to CommCare, the organization carefully developed the Kawok platform over time, building on existing mHealth tools and feedback data to create a more usable system. Kawok's initial testing began with a small group of CHWs who had experience with TulaSalud's previous mHealth system. TulaSalud gathered feedback data, which included in-depth interviews with CHWs and user testing, and followed CHWs on their patient

visits to observe how they use the application in the field. The improved application was more user friendly and reflected CHW needs and the community response to the mobile tool. For example, CHWs noticed that patients were attentive to audio messages in the application. They wondered whether localized audio messages, delivered by a community member through the Kawok application, would be more effective at delivering health-related information and influencing patients' decisions. The new version of Kawok, launched in early 2015, integrates multimedia content (video and audio messages) by local community members.

Because Kawok generates a high volume of data, TulaSalud also put effort into creating efficient systems for managing this data flow and ensuring that it was available in a timely and easy-to-use manner. The organization has built tools to automatically download data and generate a number of reports, maps, and spreadsheets, customized for different clinical and monitoring

purposes. For example, reports allow supervisors to identify the number of visits made, referrals completed, and the type of community interactions CHWs conduct. Creating this system required a similar amount of time, effort, and iterative-improvement as developing the technology platform.

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# *Measuring Impact*

The region of Alta Velapaz has seen impressive improvement in key health outcomes during the TulaSalud program: maternal deaths fell by 40 percent between 2012 and 2013.<sup>9</sup> However, the contribution of TulaSalud's program to these outcomes is not clear. Many factors affect maternal health, including economic growth and the availability of other NGOs or government programs. Without a valid counterfactual—which provides a credible estimate of what would have happened to the patients without TulaSalud's program—monitoring health outcomes among the target population is unlikely to help the organization improve the program or learn whether it is cost effective.

In a recent study, Martinez-Fernandez and co-authors (2015)<sup>10</sup> studied the

impact of TulaSalud's mHealth program on health outcomes. Their evaluation compared maternal and child mortality rates in several communities covered by Tula Salud's mHealth program with comparison areas that were served by CHWs without the mHealth component. However, assignment of communities to treatment and comparison areas was not random, and it is not certain that improvement in health outcomes can be attributed to the mHealth program, rather than to the selection of the comparison communities. TulaSalud considers the results encouraging and consistent with their expectations, but also acknowledges the study's limitations in establishing causality.

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# Goldilocks Recommendations

The TulaSalud case provides a good example of how user feedback can be incorporated into program or product design, as TulaSalud used feedback data to develop a user-friendly and efficient mobile platform and data collection system. The system also provides an opportunity to test relevant impact questions. **We focus the recommendations for TulaSalud on applying rigorous testing to improve program operations.**

**Credible: Collect high quality data and accurately analyze the data.**

TulaSalud collects a variety of data on

both outputs (such as the number of CHW cases and referrals) and outcomes (including risk factors for pregnant women and newborn health status). The risk of collecting data on outcomes is that an organization will often be tempted to assert that any observed changes in outcomes are the result of its intervention. Tracking health outcomes is not likely to accurately measure the impact of the TulaSalud program due to the many factors that can affect these outcomes.

Credibly isolating the impact of the program from external factors in this case would require a randomized control trial (RCT), or some other method to credibly measure a counterfactual. If

TulaSalud wanted to estimate its impact on health outcomes, the organization could examine opportunities that would allow it to conduct an RCT, such as expanding the program to new areas. This would provide the opportunity to randomly assign CHWs (or clusters of CHWs) to a treatment group that participates in the TulaSalud program or to a control group in which CHWs continue providing services as usual. It would allow the organization to assess its impact and generate lessons for scaling up the program in new areas.

However, measuring the impact of the platform on health outcomes may not be the most relevant question for the program. After all, an mHealth platform

is a tool to improve the performance of individual health workers who are following a medically proven course of care. Ultimately, if well-designed, mHealth technology is only as good as the health workers using it, the program's training component and ease of use is crucial for program success. In addition, training is likely to represent a large share of program costs,<sup>11</sup> and finding ways to improve it and make it more cost-effective would be a big benefit for the program.

Therefore, a more pertinent question for TulaSalud and the Ministry of Health as they prepare to scale-up the program may be: how does the type of training offered by TulaSalud affect CHW performance? This question can be the focus of operational research to inform program design. CHWs selected for TulaSalud's program would be equipped with mobile devices and Kawok, and then randomly assigned into the standard training group (TulaSalud's current in-person training), or an alternative training format (such as distance or self-training, or a training cascade<sup>12</sup>). Combined with financial data, this RCT would allow for

estimating the relative cost of various training approaches and help improve operations. This would not be an impact evaluation of the program as a whole, but rather operational research.

### **Actionable: Commit to act on the data you collect.**

The Kawok platform collects a series of health indicators that correspond to Ministry of Health requirements, which program staff use to track individuals' health status and flag issues for medical follow-up. TulaSalud's system processes data in a relatively timely manner that allows time-sensitive health issues to be flagged for immediate attention. As far as we can tell, each indicator CHWs collect is used to determine the healthcare needs of an individual or community and entails a specified action—flag for emergency treatment, intensify monitoring, provide more information, or continue the status quo.

Collecting user feedback data is crucial for designing a user-friendly platform that is well-implemented and continually improved. TulaSalud's development

process for the platform takes advantage of user feedback to add new features and review decision-making as the program expands.

### **Responsible: Ensure the benefits of data collection outweigh the costs.**

As mentioned above, conducting an impact evaluation to measure rigorously the impact of the platform on health outcomes may not be the most relevant questions for TulaSalud. Program managers may be more likely to use evaluation results from studies that assess whether CHWs are effective at encouraging adoption of optimal medical behaviors and practices, and whether there are design options that increase these adoptions.

### **Transportable: Collect data that will generate knowledge for other programs.**

Sharing their experience of program

development and continual improvement could help other mHealth programs which are just starting to launch or are considering making changes to their services. Additionally, analyzing the organization's own financial data would allow TulaSalud to more precisely determine the costs associated with the mHealth system: developing and maintaining the application, training CHWs on its use, providing technical support, and generating multimedia content. This data would be valuable in TulaSalud's operational decisions, and if shared, would provide other organizations with a more complete understanding of the costs of developing and maintaining an mHealth system.

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# *Lessons for Others*

## **1. Developing a responsible, actionable mobile system requires significant up-front investment.**

Be prepared for a significant investment of resources and frequent iteration to create the system and the strategy for monitoring it. In addition to design, data collection, processing, and analysis, back-office work is often required to check data quality and make sure that the data can be used and employed in a timely manner.

## **2. Gathering user feedback is a critical feature of the monitoring and evaluation system.**

User feedback data can help optimize and streamline an mHealth system and ensure the actionability of the data it generates.

## **3. When using proven strategies, focus evaluation resources on creating new operational evidence.**

If an approach is already proven to work, consider using an impact evaluation to answer important operational questions instead, such as how to improve program delivery.

## Endnotes

1. Free, C., Phillips, G., Watson, L., Galli, L., Felix, L., Edwards, Patel, A., & Haines, A. (2013). The effectiveness of mobile-health technologies to improve health care service delivery processes: a systematic review and meta-analysis. *PLoS Med*, 10(1), e1001363.
2. The stipend is not directly tied to the number of home visits CHWs perform. There were some earlier attempts to create incentives-based pay for CHWs but given the varied responsibilities CHWs have, including education and mentorship that is not directly recorded and monitored by Kawok, it would be difficult to implement.
3. TulaSalud experimented with sending text message reminders to CHWs for follow-up visits but abandoned this practice because of logistical issues.
4. Specifically, it will be adding more indicators, such as z scores (height/weight) for tracking nutrition among children which reflects two national priorities, 1000 day program and zero hunger.
5. The application also automatically records the duration of the CHW's visit. Performance indicators are used as part of the CHW supervision/monitoring process. Currently, individual CHW performance monitoring is not part of the data collection and is not collected systematically.
6. For example, a pregnancy may be classified as emergency case (red) if a fetus is in dangerous position, mother experiences hypertension, headaches, blurred vision, stomach cramps, etc.
7. Each Rural Health Technician supervises about 80 CHWs and visits them in person regularly to address any issues and monitor their performance.
8. Data on admissions to the health care facilities and subsequent patient outcome data are logged separately in the Ministry of Health system but over time will be more integrated.
9. USAID. (2014). Health and Nutrition. Available at: <https://www.usaid.gov/guatemala/health%20and%20nutrition>.
10. Martínez-Fernández, A., Lobos-Medina, I., Díaz-Molina, C.A., Chen-Cruz, M.F., and Prieto-Egido, I. (2015). TulaSalud: An m-health system for maternal and infant mortality reduction in Guatemala. *J Telemed Telecare*, 21(5):283-91.
11. This is relative to the cost of the technology. The marginal cost of each additional user of a platform is low once it becomes available.
12. For a description of the training cascade model, see <http://www.thiswormyworld.org/news-blogs/blogs/community-based-deworming-developing-effective-trainings-and-materials>.