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A regular series of notes highlighting recent lessons emerging from the operational and analytical program of the World Bank's Latin America and Caribbean Region (LAC).

Cutting costs, boosting quality and collecting data real-time – **Lessons from a Cell Phone-Based Beneficiary Survey to Strengthen Guatemala's Conditional Cash Transfer Program**

by Christian Schuster and Carlos Perez Brito

A 2010 Country Governance and Anti-Corruption (CGAC)-funded pilot in Guatemala employed entry-level mobile phones in conjunction with EpiSurveyor, a free, web-based software for data collection, to drastically reduce cost, facilitate accuracy and accelerate implementation of a nationally-representative beneficiary survey of Guatemala's conditional cash transfer program. As such, it illustrates the potential of mobile phone-based data collection to strengthen program monitoring, evaluation and implementation, in particular in remote and marginalized areas highly populated by indigenous peoples.

1. Seizing the Development Potential of The Mobile Phone Revolution

The growth of mobile phones in the last decade has been exceptional. By the end of 2010, global mobile phone subscriptions are expected to surpass the 5 billion mark. In particular, mobile phone users in developing countries, including the poor, have benefited from this trend; frequently skipping fixed-line infrastructure and leapfrogging directly into mobile technology they now account for two-thirds of all mobile phone subscriptions. This trend is reflected in Latin America, where mobile phones have evolved from a luxury item to an essential good. Almost 90 percent of the region's population now owns a mobile phone. In Guatemala, the number of active mobile phone subscriptions—17.3 million—even exceeds the country's population of 13.3 million and network coverage extends to most of the country's territory, including numerous historically marginalized rural areas highly populated by indigenous peoples.

Due to this rapid growth, mobile-based applications have penetrated areas as diverse as public administration, health, education, banking, agriculture, and business development—even in the remotest areas of the globe, reaching poor and isolated communities. For example, mobile-based applications can now be undertaken in a multitude of specific development interventions: financial services to store and send money, alerts to refugees about food aid deliveries, distance education courses, citizen polling station surveillance, remote health care consultation and diagnosis, and timely market information to fishermen to name just a few in a fast-growing list.

While research to evaluate these mobile interventions has been growing, there are relatively few studies of the use of mobile technology itself as a research instrument in developing countries. Mobile data collection projects to capture outcomes are abundant, but there are far fewer large-scale and complex surveys using mobile phones. The potential mobile phones hold in this regard is striking; compared to a traditional process using paper-and-pencil forms with later transcription to a computer system, mobile devices offer immediate digitization and transmission of collected data at the point of survey, followed by automated data aggregation. As such, mobile phones promise faster, more cost-effective and more accurate surveys.

In view of these advantages and to expand the evidence base on the use of mobile phones as a research instrument, a national survey of beneficiaries of *Mi Familia Progresa (Mifapro),* Guatemala's conditional cash

transfer (CCT) program, was undertaken with low-cost mobile phones and free software for data collection as part of the 2010 Country Governance and Anti-Corruption (CGAC)-funded activities.

2. Project Context and Objectives

In March 2008, the Guatemalan government developed the CCT program in the face of historically high levels of exclusion—with 51 percent of the population living below the poverty line and nearly half of all children suffering from chronic malnutrition. By the end of 2010, more than 900,000 women were benefiting from the program. While Mifapro has the potential to significantly reduce extreme poverty, its main challenges lie in the effective management of its monitoring and evaluation system, including monitoring of conditionalities in health and education. A critical step to overcome this challenge is gaining access to quick and accurate first-hand information on activities at rural clinics and schools in isolated parts of the country. This puts a premium on a cost-effective mechanism to collect field data.

As part of the Bank's CGAC sector strategy in the country, a paper-based survey of 200 beneficiaries in five of the poorest municipalities was financed with 2009 CGAC funds to provide demand-side information to strengthen Mifapro's implementation. The Instituto de Investigaciones Económicas y Sociales (IDIES), of the Universidad Rafael Landívar[1] carried out the activity. Quantitative information about key aspects of the program—including the targeting effectiveness of the program, compliance with and awareness of conditionalities, costs of compliance for beneficiary households and behavioral changes induced by the program—supplied the government's monitoring and evaluation system with essential input.

Source: Universidad Rafael Landivar (2010)

In 2010, this survey exercise was repeated with the same institution as part of the CGAC-funded activities and strategy. This time, however, the methodology for data collection shifted from paper-based to mobile-phone-based. As such, a comparative analysis of the cost, accuracy and speed of the two methodologies was similarly possible.

3. Methodological Approach

While paper-based data collection methods have been the standard method for decades, they tend to suffer from frequent errors, storage burdens and high costs of double data entry. Handheld devices—primarily personal digital assistants (PDAs)—are increasingly replacing paper-based methods, but face shortcomings themselves: the data need to be downloaded to laptops in frequent intervals, are not available in real-time, and may be corrupted or even lost if PDAs are damaged, misplaced, or stolen.

Mobile-phone-based data collection systems have the potential to overcome these limitations. They can be used with several types of data collection clients, the most common of which include fixed format SMS, voice-based data collection, web-based forms and Java-based applications. Short Message Service (SMS) and voice-based surveys are particularly useful for short, self-administered data collection. Voice-based surveys are especially preferable in regions with low levels of literacy. For more complex surveys, however, web-based forms and Java-based applications offer advantages in terms of cost and user-friendliness. First, they facilitate adherence to context-dependent questionnaires, as they can determine which questions should be answered or skipped. Second, they allow for uploading of completed surveys to host servers using low-cost general packet radio service (GPRS) without limiting the size of the survey form—as, for instance, the case with SMS. While web-based forms require mobile phones with web browser capabilities, Java-based applications can be downloaded onto less expensive, entry-level mobile phones.

The 2010 CCT survey therefore chose to rely on the Java-based application, *EpiSurveyor*, a mobile data collection tool funded by the United Nations Foundation, Vodafone Foundation, and a World Bank Development Marketplace Grant. *EpiSurveyor* works on a "freemium" model, offering a free basic version (which more than 99 percent of subscribers use) and a paid version with premium features. Within less than a year after launch, it had over 2,000 users.

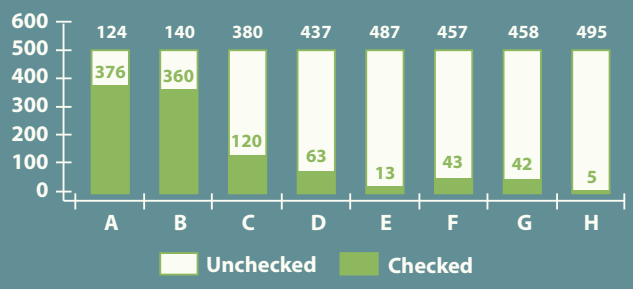
[1] **http://www.url.edu.gt/Portalurl/**

EpiSurveyor is the first cloud-computing application for data collection in international development. Users with basic computer skills can log in online at **www.episurveyor.org** to create survey forms and questions, including multiple-choice, free text, numeric, data, and other types. The survey forms can then be downloaded to any Java- and GPRS-enabled mobile phones. The phones can thus be used to collect and upload data in real time to an *EpiSurveyor* account through a secure server or to a laptop, as needed. The *EpiSurveyor* website allows for real-time visualization of the survey responses and analysis of the aggregated and disaggregated data through graphs, charts, and maps as well as data exporting to common third-party data analysis programs such as Microsoft Excel or Access (Figure 1). In addition, the mobile phones themselves can be used to view and analyze aggregated data. All survey data are thereby encrypted to maintain confidentiality of responses. Access to the data is restricted by password, with the ability to provide different access privileges for different types of users.

Figure 1: Visualization of *EpiSurveyor*

Survey Question: *¿Qué compromisos u obligaciones adquirió usted con MIFAPRO para tener derecho al beneficio en efectivo?*

	Option	Checked (%)	Unchecked (%)	Total (%)
A	Llevar regularmente a los niños a la escuela	376 (75)	124 (25)	500 (100)
B	Llevar a los niños a control en el centro de salud	360 (72)	140 (28)	500 (100)



Source: EpiSurveyor, WB CCT Survey, 2010

The Bank's 2010 CCT survey was the first nationally representative study using *EpiSurveyor* in the country. A team of nine data collectors interviewed 500 Mifapro beneficiaries (mainly indigenous women) in 25 municipalities, in addition to the 200 beneficiaries which had been interviewed in five municipalities in the 2009 survey. The sample included beneficiaries living in some of the poorest and most isolated municipalities in the country, demonstrating the potential to monitor and improve program implementation in rural areas.

4. Outcomes

Compared to its 2009 paper-based counterpart, the 2010 mobile-phone-based survey proved highly superior in terms of cost and showed notable improvements in quality control and the implementation speed of the survey.

Efficiency Gains: Cell-Phone-Based vs. Paper-Based Data Collection	
Average Interview Cost	-71%
Average Interview Length	-3.6%
Data Collection Quality	Improved
% of Interviewers Preferring Cell-phones for Data Collection	88.9%

Most notably, the cost savings resulting from immediate digitization and transmission of collected data with subsequent automated data aggregation offset by far the purchasing and data transmission costs of mobile phones. Through the mobile phones, the average cost per interview data collection and digitization was cut by 71 percent, which permitted an increase in the survey's sample size from 200 to 700 and the achievement of national representativeness while maintaining a flat budget for the survey.

In addition, real-time data collection facilitated quality control by the supervisors of the field work. The system registered date and time of each interview, not the time of submission; when no mobile phone coverage was available, surveys were stored in the phone until a signal was found. The web interface allowed the supervisor to monitor the work rate, when work began and ended, and to detect any data inconsistencies. Supervisors could then respond immediately by calling the data collectors. In addition, easier data entry improved accuracy; most interviewers noted that the mobile phones reduced the likelihood of errors in entering data. In addition, automated uploading of the data omitted

the need for digitization, which tended to enhance errors by between 1 and 2 percent in the previous survey. Finally, the survey never experienced any data loss, as is frequently the case with paper- or PDA-based approaches.

Beyond lower cost and facilitated accuracy, mobile phones also helped speed up the time required for interviews. According to measurements undertaken in the initial training workshop, mobile phones brought down the time required for surveys by 3.6 percent. After the survey, nearly 90 percent of the data collectors concluded that interviews can be undertaken faster with mobile phones than with their paper-based counterparts.

These positive outcomes are reflected in the favorable perceptions of interviewers about the use of mobile phones for data collection. **All of the interviewers reported** that it was either 'easy' or 'very easy' to learn how to use mobile phones for data collection–not the least thanks to their familiarity with mobile phones in their private lives. Nearly 90 percent preferred to collect data using mobile phones in future surveys.

The survey, however, also pointed to a potential pitfall in the use of mobile phones. Slightly over 20 percent of interviewers observed negative reactions among their interviewees to the use of mobile phones for data collection. While the increasingly ubiquitous access to mobile phones is likely to lower resistance, their use as a survey instrument should thus be based on an assessment of their acceptability among the target population, particularly poor indigenous populations.

5. Caveats and Conclusions

For the 2010 CCT study, the use of low-cost mobile phones in conjunction with the free *EpiSurveyor* software drastically cut costs while facilitating quality control and improving implementation speed. Thanks to these improvements over traditional methods, the study has already had an important demonstration effect on the adoption of the technology in the country and within the World Bank. To illustrate, the government has announced that it will adopt the approach not only for the monitoring and evaluation system of the CCT program, but also in a nationwide survey on nutrition for the Ministry of Health. To further illustrate, a proposal (Use of Cell-Phone Data to Collect and Process Data to Strengthen Monitoring, Control and Accountability of CCT Programs in Latin America) will be funded by the highly competitive Bank Innovation Fund in 2011.

While these findings add important evidence to the viability of mobile phones as a data collection tool in developing countries, the number of studies providing similar evidence is still limited.[2] Not less important, mobile-phone-based solutions should not be considered as a panacea for all data collection problems. To illustrate, while they facilitate quality control, they cannot detect all types of data fabrication; random and timed answers, for example, would still go undetected.

As this study and the growing adoption of *EpiSurveyor* suggest, mobile phones are increasingly powerful tools for data collection. In the future, ongoing technological advances and increased access will further improve the potential of mobile phones for accurate data collection. Mobile phones with Global Positioning System (GPS) capabilities, for example, could detect the aforementioned data fabrication. Recognizing and harnessing this potential can provide high returns for future survey exercises and, as such, strengthen program governance in a quick, accurate and cost-effective manner -- in particular in rural and marginalized areas.

[2] See, for instance: Tomlinson, Mark et al. (2009) The use of mobile phones as a data collection tool: A report from a household survey in South Africa. BMC *Medical Informatics and Decision Making* 2009, 9:51. Available for download at **http://www.biomedcentral.com/content/pdf/1472-6947-9-51.pdf**

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