

MasterCard Worldwide & Mercy Corps:

ELEVATE Phase I Report

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I. INTRODUCTION

Thank you for MasterCard's support of the ELEVATE program, which seeks to improve the speed, security and cost-effectiveness of cash and voucher programming through the use of mobile vouchers. Mercy Corps is pleased to submit this Phase I report which describes results and learning from mobile voucher tests conducted in slum areas of Kathmandu, Nepal.

The Nepal pilot focused on testing several key stages in the deployment of mobile vouchers, including the following:

1. Identify a technology partner,
2. Customize a mobile voucher platform, and
3. Use the platform to distribute goods to people in need.

Two different types of mobile vouchers (SMS and smartphone application) were tested and evaluated. The vouchers provided assistance to some of Kathmandu's poorest residents: families who struggle to meet their basic needs, have limited literacy and are often unfamiliar with basic mobile technology. By the end of the pilot, 228 vouchers (100% of the total distributed) had been successfully redeemed through the two different mobile voucher solutions. While the smartphone application vouchers were reliable and efficient and are highly recommended for future deployments where that technology exists, SMS vouchers presented higher error rates and were more difficult for users to redeem.

The opportunity to experiment outside of an actual emergency provided a rare and valuable opportunity to advance our understanding of the technology available for mobile vouchers. While ELEVATE initially sought to develop a globally deployable mobile voucher system, our experience in Nepal revealed that each new deployment of mobile vouchers will require customization to accommodate differences in program design, beneficiary accessibility barriers (such as low literacy levels) and local mobile network availability. These customization requirements mean that a single, pre-packaged, globally deployable mobile voucher solution is not cost effective for one NGO to develop and manage at this time.

However, the Nepal experience reinforced our belief that using mobile vouchers can improve the speed and cost-effectiveness of cash transfer programs (CTPs). It also showed that the underlying technology and actors required for mobile vouchers (including mobile phone networks and companies with platforms that can manage mobile vouchers) exist and are often affordable. But humanitarian practitioners need guidance and tools to put these puzzle pieces together to create solutions that are more cost and time effective than traditional (non-mobile) methods.

In the next phase of the ELEVATE program, we will focus on developing a toolkit that will empower program teams from Mercy Corps and other organizations to integrate mobile vouchers into emergency response and recovery programming. A second mobile voucher pilot will use and adapt lessons and templates from Nepal in the Democratic Republic of Congo (DRC). Following the DRC pilot, lessons and resources will be compiled in a toolkit that will help practitioners understand the menu of technical options currently available and select options that support their program objectives. It will provide practical resources, including assessment tools and contract templates that can help practitioners better manage service providers and maximize information and management benefits offered by electronic platforms. Mercy Corps is also enthusiastic to participate in MasterCard's development of new products and services that can move us towards a global solution and major breakthroughs in this space.

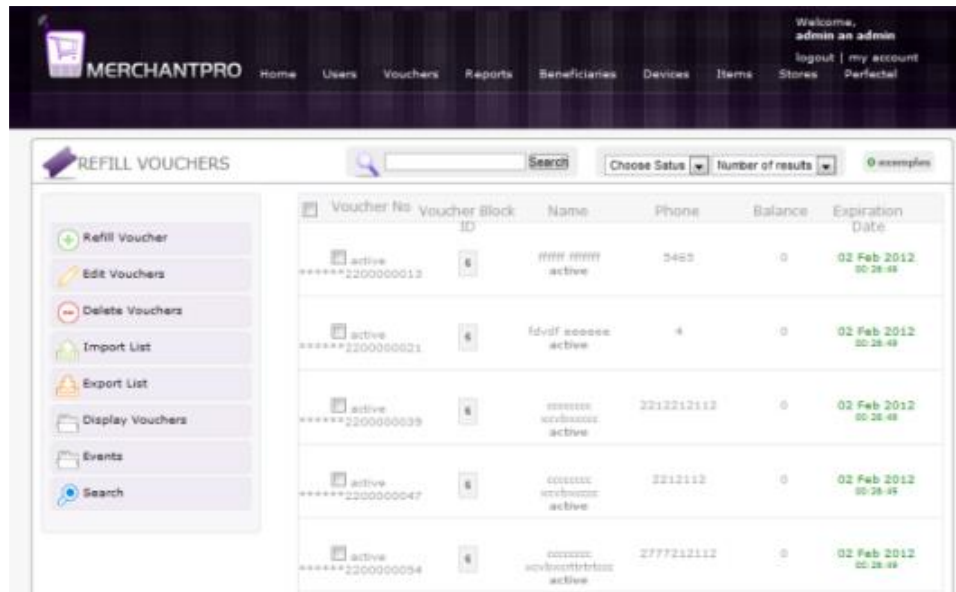
II. MOBILE VOUCHER TECHNICAL DESCRIPTION

Partner Selection

Using mobile vouchers to make humanitarian aid delivery faster, safer and more cost-effective requires technical partners that understand and design products appropriate for emergency response. The first two months of this pilot were dedicated to exploring and understanding what types of service providers are best suited for that challenge.

After market research and analysis of several potential service partners, Mercy Corps decided to partner with a Haitian company, Transversal, that offers an existing mobile voucher platform and has experience providing mobile vouchers in emergency contexts. Transversal developed several types of mobile vouchers that were used following Haiti's 2010 earthquake. Working with an established mobile voucher provider allowed us to minimize development time and investment and experiment with a variety of mobile voucher configurations. Transversal had not worked outside of Haiti prior to this pilot and agreed to start working with Mercy Corps in March 2013 to adapt their platform for international use.

Mercy Corps tested two types of mobile vouchers with Transversal, SMS vouchers and smartphone application vouchers. Both SMS and smartphone vouchers were managed electronically by Mercy Corps through Transversal's online MerchantPRO platform. This platform stored information on beneficiaries, vendors and vouchers and acted as both a voucher control panel and dashboard. Mercy Corps was able to distribute and monitor vouchers through this centralized system, which offers real time information on disbursement and redemption patterns.



Screenshot of MerchantPRO voucher management platform.

Precise real-time information on voucher use can be used to monitor the program and identify and resolve issues, such as problematic transactions, unexpected shop closures or beneficiaries at risk of losing vouchers due to expiration dates.

SMS vouchers were the first type of vouchers tested. The voucher was sent to a beneficiary's phone as an SMS message that included the voucher contents and validity period. Both vendors and beneficiaries were required to have a phone (those without phones borrowed from family or friends) and their unique phone numbers were registered in the MerchantPRO platform. When the beneficiary was ready to purchase goods at an approved vendor, the voucher was redeemed through a series of SMS messages exchanged between the vendor, the MerchantPRO platform and the beneficiary.

A typical SMS voucher transaction involved the following steps:

1. A vendor initiates the transaction by sending a message from his/her registered phone to the MerchantPRO system phone number. (A local phone account is procured and dedicated as the “system” phone number for the duration of the program.) The vendor needs to enter an exact phrase for the system to recognize and respond:
“basket <beneficiary phone number>” for commodity vouchers or
“cash <amount> <beneficiary phone number>” for cash vouchers. This initiation message prompts a response message from MerchantPRO.
2. The MerchantPRO platform then responds with an SMS message sent to the beneficiary phone requesting their 4-digit PIN.
3. The beneficiary checks the purchase amount in the message and replies with **“PIN <4 digit pin code>”** to confirm purchase.
4. MerchantPRO sends a confirmation message to both vendor and beneficiary.



SMS confirmation message, which uses Romanized Nepali to state: “Thank you! Please take your items from the shop.”

Vendors and beneficiaries can also check their balance and receive error messages via SMS.

Additional partnerships were required to enable actual sending and receiving of SMS messages through local mobile networks. Companies called SMS aggregators (also known as SMS gateways) connected to MerchantPRO’s platform through an Application Programming Interface (API) that allows a free flow of messages between users and the platform. The gateway connected directly to all local mobile operators’ SMS message centers via the Internet or direct connections. The gateway also ensured that messages were correctly formatted, were “understood,” and triggered appropriate actions by the MerchantPRO platform. Using SMS aggregators eliminated the need for individual negotiations and connections with each local mobile network, and allowed the system to operate using local phone numbers.

The ELEVATE pilot tried two different SMS aggregators: txtNation, a UK-based company, and Tivre, a Singapore-based company. txtNation provided a “hosted SIM” solution with a normal full-length Nepali phone number. Tivre provided a “short code” – an easy to remember four-digit number (4001). When the SMS aggregators connected with MerchantPRO through their API, messages from users successfully triggered voucher redemption actions, such as PIN entry, confirmation messages or balance updates.

Smartphone vouchers were the second type of mobile vouchers tested. These vouchers only required the vendor to have a smartphone that was capable of downloading and using Android applications and that had access to a data connection to send and receive data from the application. Beneficiaries did not need to have access to a phone to use this type of mobile voucher. Vouchers were processed using an application created by Transversal called “VoucherPRO” that each vendor downloaded to their phone.

A typical smartphone voucher transaction included the following steps:

1. Beneficiaries receive a voucher number and a secret PIN from Mercy Corps.
2. Vendor enters the voucher number and checks the voucher validity (by pressing the “check voucher” button) on the VoucherPRO application.
3. The application flashes a “voucher accepted message” and the balance of the voucher. The vendor enters the purchase amount and presses charge.
4. A new screen opens showing the purchase amount and requesting the beneficiary PIN. The vendor hands the phone to the beneficiary so that s/he can enter her/his secret PIN.
5. Beneficiary enters her/his PIN on the smartphone and receives a confirmation message, then hands the phone back to vendor.
6. Beneficiary receives the goods.

III. PILOT PROCESS

The pilot provided vouchers to 129 beneficiaries using five vendors in two communities. Standard operating procedures for CTP were followed, including best practices on beneficiary and vendor selection. Key steps in mobilizing and preparing the community for voucher distribution included:

1. **Beneficiary identification:** After consultation with local government, authorities and civil society groups, Mercy Corps, together with our local partner Lumanti, identified slum communities along Kathmandu’s polluted riverbanks to participate in the pilot project. Once communities were identified, individual participants were selected in consultation with local leaders using vulnerability criteria that scored and prioritized participation. Targeted households included those that were female-headed, elderly-headed, very poor, disabled or chronically ill.

The average age of selected beneficiaries was 52, of whom 90% were female and 70% were illiterate. The average household size was 4.9 and 94% of households owned a mobile phone, while the remaining 6% were able to access phones from friends or neighbors. Of the 129 beneficiaries, 99 received and redeemed two SMS vouchers and 30 received one smartphone voucher, for a total of 228 vouchers distributed and redeemed. The vouchers were valued at approximately \$34 USD, for a total of \$7,752 USD distributed.

Vendor selection: Six vendors were selected based on the size of their enterprise and quality of their products, proximity to beneficiaries and willingness to participate and abide by program rules. Of the six selected vendors, one withdrew from the program prior to voucher redemption because he didn’t have the bandwidth to participate. All five vendors participated in the SMS voucher redemption process, and two of these were selected to test the smartphone application vouchers.



Smartphone Voucher Application Interface

2. **Training of beneficiaries and vendors:** Both vendors and beneficiaries attended training offered by Mercy Corps staff to learn about mobile phone basics and SMS, the voucher process and program rules and procedures. Both trainings integrated visual learning aids, such as the poster (right), which describes how to use the system. Beneficiaries and vendors involved with the voucher program were given a small amount of money to cover the costs of messaging (SMS messages cost on average .01 USD and participants were provided with .86 USD of credit. Vendors received approximately \$2.50 USD of credit to cover their costs.)



Above: Training poster used to teach beneficiaries about the ELEVATE project.

3. **SMS Voucher distribution:** SMS voucher recipients received two vouchers. Fifty participants received cash vouchers, meaning they could purchase anything available at participating stores (except alcohol and tobacco) up to the total value of the voucher. An additional forty-nine participants received commodity vouchers, meaning they received a fixed basket of rice, lentils, a rice snack (“beaten rice”) and oil. Both groups received an SMS message on the first day of voucher validity that contained the voucher value and redemption period. Due to limited availability of Devanagari script for SMS in Nepal (the local alphabet), messages were delivered in Romanized Nepali.

4. **Smartphone application voucher distribution:** Thirty smartphone voucher recipients received a card with their voucher number and the validity period directly from Mercy Corps staff during registration and training. Vouchers were active when beneficiaries received their voucher card, and they could go directly to stores to redeem the goods.

5. **Post distribution monitoring and support:** Following distribution, Mercy Corps and partner agency staff monitored redemption processes and supported beneficiaries as needed. All vouchers were redeemed within three days of distribution. Beneficiaries could call a support line to ask questions or request assistance, but more frequently asked program staff for support when they saw them in the community or at participating shops. Monitoring included surveys with 37 households, surveys with each vendor and structured observations of transactions by Mercy Corps staff and community mobilizers.

6. **Reimbursement to Vendors:** MerchantPRO provided initial reimbursement reports which were reviewed and approved by program staff, triggering an SMS message with total reimbursement amounts to vendors. The vendors had a 24-hour window to reply to the message confirming the right amount, or were obligated to contact Mercy Corps to dispute the reimbursement amount if they believed it was incorrect. Mercy Corps then resolved any differences between system and

vendor records (this was necessary in one case where the vendor made a mistake in tracking). When vendors confirmed amounts, a payment request was sent by program staff to Mercy Corps Nepal's finance team with system-generated individual vendor transaction reports (listing all transactions) attached. The finance team then reviewed, approved and processed a reimbursement to the vendor's bank account. Vendors all received payment within one week of confirming their reimbursement amount via SMS. Fund transfers were initiated by Mercy Corps within two days, but some transfers between Mercy Corps' bank and the vendors' bank took up to a week to complete.

IV. RESULTS AND DISCUSSION

The pilot successfully tested two types of mobile vouchers, which provided an opportunity to understand acceptance of the technology with end users, develop standard operating procedures and create systems that will enable future use of mobile vouchers and other technologies within Mercy Corps programs and beyond. Results from this pilot include metrics on reliability of different mobile voucher methods, ease of use among beneficiaries and management efficiency for Mercy Corps. Specific results are presented and discussed in this section.

Program Management Efficiency

Switching to mobile vouchers from traditional cash or paper vouchers requires changes in operating procedures. The shift both introduces new requirements and responsibilities (increasing management burden for tasks including platform testing), but saves time in data entry and provides other benefits, like access to more reliable and real-time program data on voucher redemption. New responsibilities that are required for programs incorporating mobile vouchers include:

1. **Setting up the technology:** Assessment and selection of a platform provider (Transversal) took about six weeks. Customization and integration with SMS gateways required an additional three weeks. We will be able to shorten these timelines as mobile networks grow stronger and as we become more familiar with mobile vouchers as an agency, but there will always be a set-up and integration period that requires dedicated staff time.
2. **Customized training:** In addition to covering program basics and rules (voucher contents, participating stores, validity period, prohibited items), mobile voucher programs need to ensure that participants are able to understand and use the technology (SMS, touchscreens, etc.). Nepal results showed that two-hour training was not sufficient to teach illiterate and elderly beneficiaries about using SMS or touchscreens to enter a four-digit PIN. Simpler technologies and more training time will be required in the future.
3. **Technical troubleshooting:** Staff time is required to communicate any technical issues to the platform provider, and also to monitor the platform and respond to vendor and beneficiary queries. This role required a full-time staff person during the first two days of voucher redemption, as various errors were identified and resolved. Fifteen percent of voucher redemptions required significant troubleshooting and support from Mercy Corps staff and were registered in an error log. In addition, program staff provided on-site support to even more transactions (25% of observed SMS voucher redemptions and 37% of observed smartphone voucher redemptions).

Key benefits and time savings resulting from use of mobile vouchers include:

1. **Access to information from the web platform:** Timely information from the platform allowed program staff to closely monitor voucher activity. This type of information is completely unavailable in cash and paper voucher programs and allowed staff to follow up proactively on potential issues, such as beneficiaries who were slow to redeem their vouchers and stores that had lower than average customer visits.
2. **Staggering voucher redemption:** Staggering the release of SMS vouchers is a highly desirable feature which prevents vendors from being overloaded with a crowd of beneficiaries at one time.
3. **Improved vendor reimbursement process:** Where vendors in paper voucher programs often have to travel to the Mercy Corps office to submit receipts/voucher stubs and an invoice, the electronic system eliminated this need and sped up the vendor reimbursement process. A financial process that often takes days took approximately two hours to complete in the Nepal pilot.

Discussion: Compared with a paper voucher program, mobile vouchers in Nepal required extra time for platform selection and development, testing and troubleshooting. However, we saved time through a quicker vendor reimbursement process and experienced other benefits (like access to better data and control over voucher disbursement). Based on the Nepal experience, we expect that using mobile vouchers can offer savings in staff time and cost when they are used to replace paper vouchers in places that meet minimum connectivity requirements. However, rigorous time use and cost comparisons will be carried out in the next phase of piloting in the DRC and will provide more conclusive results about the efficiency comparisons of mobile vouchers vs. paper vouchers, cash and mobile money. Lessons and tools resulting from both phases of ELEVATE will help us become more efficient at setting up and using different types of mobile vouchers.

SMS Voucher Transaction Speed and Success Rate

On average, SMS voucher redemption processes were slow and unreliable. Forty percent of SMS voucher recipients surveyed reported significant delays in redeeming their vouchers. This is an unacceptably high error rate that would need to be reduced prior to use in a true emergency context. While a majority of transactions (calculated starting once a vendor started typing the first SMS message) took less than 4 minutes to complete (64%), 24% required 2-5 minutes and 12% took longer than 5 minutes. When redemptions took longer than five minutes, it frequently took over an hour to resolve the issue causing delay, which contributed to a long average SMS transaction time of 11.2 minutes.

Causes for slow redemption processes and high rates of transaction failure include:

1. **SMS message failures:** SMS messages do not have a 100% delivery success rate and some messages simply were never delivered, causing a failed transaction or preventing confirmation messages from being sent (See discussion below).
2. **Device issues:** Six beneficiaries provided a wrong phone number to Mercy Corps, or tried to redeem their voucher with a different phone, so their phone number wasn't recognized by MerchantPRO. Other issues involved phones storing two SIM cards and using the wrong (unregistered) SIM to complete a transaction. In two additional cases phones were not capable of sending SMS messages (SMS function disabled or broken).

3. **Lack of credit on phone:** Despite the fact that beneficiaries and vendors were provided with money to purchase SMS credit, one vendor ran out of credit during a busy redemption period, causing delays.
4. **User errors:** Vendors and beneficiaries did not always enter the exact syntax needed to process voucher redemptions. If any messages in the transaction sequence were incorrectly formatted, the user would be forced to try again in a five minute window, or the entire transaction failed. SMS logs show that 8% of users entered their PIN incorrectly and had to restart their transaction (TIVRE transaction logs).
5. **Timeout issues:** In addition, a timeout was established after five minutes so that if any step of the transaction took more than five minutes, the transaction would terminate and users would need to start over. In some cases, this timeout occurred too quickly and resulted in transactions timing out before users had an opportunity to complete their step in the transaction.
6. **MerchantPRO system weaknesses:** Problems with the configuration of the MerchantPRO platform was responsible for 8 (23%) of the logged errors. Most MerchantPRO-related errors occurred during the second round of vouchers and resulted from changes in the integration with the second SMS aggregator. Types of issues affecting users included:
 - Beneficiaries didn't get the correct PINs or were sent multiple PINs
 - Commodity vouchers were incorrectly reported to have insufficient funds
 - Vendors weren't sent the notification about the second round of transactions

Discussion: The relatively complicated four-step process of the SMS transactions increased odds of failure, since, if any one step in the transaction failed, a whole new redemption process often had to be started. This increased the total number of transactions that failed completely. The lack of local script (Devanagari) for SMS was a further limitation for beneficiaries with low levels of education, as messages were transmitted in Romanized Nepali.

This is particularly problematic with SMS, which, as an asynchronous technology, can't guarantee delivery of messages within prescribed time duration or in the specific order. It can have a failure rate of up to 2% in ideal circumstances, but is typically reserved for one-time activities such as notifications and alerts / reminders, and not for multi-step activities like financial transactions or voucher redemptions (Thoughtworks)¹. Many of the difficulties encountered with SMS voucher redemption resulted from the inherent limitations of SMS as a communications channel and cannot be completely eliminated from future SMS-based mobile vouchers.

Future use of SMS vouchers should be limited to situations where more reliable channels like data networks and USSD are not available. When used, SMS should seek to simplify the transaction sequence and eliminate the requirement of the beneficiary phone wherever alternate forms of ID authentication exist. Removing the beneficiary phone from the transaction process would significantly reduce the number of device issues. In addition, more rigorous testing with software providers is recommended, and providers should be asked to inform Mercy Corps if any changes to the system are made after testing is complete.

¹ Thoughtworks is a global software development company that has a global MoU to provide Pro Bono consulting services to Mercy Corps on technology challenges. Two ThoughtWorks consultants visited Nepal to observe and provide recommendations on mobile vouchers. Their insight and suggestions are reflected throughout this report.

Smartphone Voucher Speed and Success Rate

On average, the smartphone application redemption process had fewer errors and was quicker than the SMS voucher, although both methods were challenging for beneficiaries who were illiterate or unfamiliar with using mobile phones. The average SMS transaction time of 11.2 minutes was much slower than the average data application transaction time of 98 seconds. While the SMS average is skewed by several extremely long SMS transactions (56% of transactions took under 4 minutes), the data application presented less delays and technical problems. Major delays in purchasing goods were reported by 40% of SMS voucher users compared to 0% of smartphone app users. Beneficiaries experienced difficulty entering their PIN on a touchscreen with the data app, but were assisted by helpers and project staff.

Inclusivity Issues and User-Access Barriers

The high rates of illiteracy (70%) and a large number of elderly and other beneficiaries unfamiliar with SMS and smartphones presented another challenge for voucher redemption. Mercy Corps encouraged beneficiaries who were not confident with the technology to rely on trusted family members or friends (“helpers”) to help them with the transaction, or to request help from program staff. These helpers were then registered with Mercy Corps. Mercy Corps emphasized that beneficiaries should physically go to the stores and enter their PIN personally, but this was not always feasible or abided by. Although beneficiaries were present at 96% of observed data voucher transactions and 97% of observed SMS transactions, they overwhelmingly relied on “helpers” to assist them in completing the transaction. Helpers entered the PIN in 89% of observed SMS transactions vs. 37% of observed smartphone transactions.

Women were overwhelmingly chosen as beneficiaries for the program (90% of beneficiaries were female), meaning that differences in usage patterns between men and women are hard to detect due to the small comparison group of men. As expected, 100% of vendors reported that a majority of beneficiaries redeeming vouchers were women. Forty percent of vendors perceived that transactions were easy for men, while only 9% of vendors reported that transactions were easy for women.

Elderly recipients experienced a great deal of difficulty with the transactions: 88% of vendors reported that the elderly had a difficult time with the technology, and 67% of vendors reported that illiterate populations had a difficult time redeeming mobile vouchers.

Many beneficiaries not only had difficulties with transactions, but demonstrated confusion about basic program concepts:

- 60% of SMS voucher recipients reported difficulty understanding the redemption process even after receiving their goods.
- Only 33% of SMS voucher users could explain how they checked the amount charged for their purchase prior to entering their PIN.

By contrast, smartphone voucher recipients demonstrated a stronger understanding of voucher concepts, although still showed significant gaps in understanding the voucher process:

- 83% of beneficiaries could tell us the correct expiration date of the data app voucher (vs. only 30% of SMS voucher recipients surveyed).
- 71% of participants knew how to check their balance (vs. only 29% of SMS voucher recipients).

Discussion: Many users simply found the SMS process too complicated and difficult as a result of their low literacy levels, unfamiliarity with SMS and lack of experience with the Roman alphabet. As a result, many beneficiaries were not able to complete transactions alone (relying on helpers), or had long wait

times to complete their transaction. Even entering a PIN on a smartphone screen was difficult for users who had never used a touch-screen device before. Elderly participants in particular showed a lack of ability and were distracted and unengaged during trainings. Beneficiaries surmounted accessibility barriers in a variety of ways, such as enlisting the support of tech savvy family members or friends, borrowing phones and asking staff or vendors for help. While all were able to use their vouchers eventually, they relied on the help of others, or had to make multiple attempts to redeem their vouchers. In an emergency setting, we hope that our solutions will be workable and easy to use for the direct beneficiaries without having to rely on others for support.

When involving helpers, it is important to recognize that risks of leakage (goods not being delivered to their intended user) and diversion from the intended beneficiary increase. Only one user of those surveyed reported helpers keeping some goods for themselves (a small amount of commodities). While only one case of leakage was reported in the pilot, incidences may increase in larger programs where staff has a lighter presence. Observed instances of vendor-supported PIN entries are particularly problematic², as vendors could use that opportunity to exploit beneficiaries.

Reliance on helpers can also affect beneficiary control over the transaction, including what the intended beneficiary is able to purchase. Among surveyed households, a helper decided what to purchase in 14% of cases, other household members decided in 29% and the participant herself in 57% of cases. While these user access issues will always be difficult to eliminate entirely, they may be minimized through more proactive involvement of “helpers”. This could involve training helpers so that they understand their role in the process and that the designated beneficiary should receive all goods.

V. LESSONS LEARNED

While ELEVATE initially sought to develop a globally deployable mobile voucher system, the first phase of piloting has shown that differences in program design, beneficiary accessibility barriers (like low literacy levels) and local mobile network availability, customization will typically be required with each deployment in a new country or region. While a single pre-packaged globally deployable mobile voucher solution does not seem feasible at this time, we may see major breakthroughs in this space in the future, especially with the commitment MasterCard has made toward global platform development. Fortunately, the basic requirements for mobile vouchers are available widely, and Mercy Corps will use products from ELEVATE to help practitioners use existing technology for mobile vouchers.

Learning captured in a toolkit developed following ELEVATE’s pilot tests, will empower program teams from Mercy Corps and beyond to integrate mobile vouchers more easily into emergency response and recovery programming. Eventually we will look to MasterCard’s (or other) new products and services to get us further along the path toward a global solution. The toolkit will help practitioners understand the menu of technical options currently available for mobile vouchers and quickly select the option that is best suited for their program. It will also help practitioners better manage service providers and maximize information and management benefits offered by electronic platforms. Learning from Nepal has already provided important insights into each of these learning priorities, which are shared below. This information will eventually be elaborated on and incorporated into the toolkit.

1. Understand and select the best available channel for mobile vouchers

² 17% of beneficiaries surveyed report receiving help from the vendor to enter their PIN.

Selecting a channel: Various mobile technologies and communication “channels” exist to receive and transmit mobile voucher data through a centralized platform. Channels include SMS, USSD, Smartphone data applications and Interactive Voice Recognition (IVR). The choice of channel will impact the transaction flow and overall user experience. In general, there are tradeoffs between technologies that are widely available and easily customizable versus those that offer the simplest transaction flows. For example, SMS is far from perfect for transactions, but is quick to set up and almost universally available. Data applications offer a wide array of transaction flows and options to accommodate illiterate beneficiaries, but rely on a data network.

Channels should be evaluated for the following characteristics:

- **Usability:** How accessible or difficult will this channel be for end users? Will they need to have basic literacy to complete a transaction? Is it available in local scripts?
- **Reliability:** What % of errors/dropped messages/network outages is typical using this channel?
- **Availability:** Is this channel available in all markets? How easy or difficult is it to gain access to the channel?
- **Standardization:** How easily can a channel connect to a centralized platform like MerchantPRO (usually through an Application Programming Interface)?
- **Device/hardware requirement:** Does the channel require a smartphone or other device that local participants are unlikely to own already?

Cost is another important factor to consider but will vary widely from market to market and will require local analysis. A summary of available messaging technologies is presented below:

	SMS based	Smartphone application	USSD	Voice based (IVR)
Usability	Hard	Easy (but depends on app configuration)	Hard	Easy
Reliability	Low	High	High	High
Availability	High	Low	Low	High
Standardization	High	High	Low	Low
Device requirement	Feature Phone	Smartphone	Feature Phone	Feature Phone

The Nepal pilot allowed testing of two channels: SMS and smartphone application. USSD is not usually offered to third parties in Nepal, and voice based transactions (IVR) were deemed too complex and costly to use for program purposes.

Vendors using both technologies reported that smartphone vouchers were easier and preferable over the SMS voucher transaction. The average SMS transaction time was significantly higher than the data application transaction time. While beneficiaries still had difficulty entering a PIN on the smartphone application, it offered a much more reliable transaction and a better overall user experience. Where data networks are available, smartphone applications offer a reliable, easily customizable option for mobile voucher redemption.

In future deployments, smartphone applications are the most desirable channel where data networks exist due to their flexibility and ease of use. Although we were not able to test USSD in Nepal, it is the

next most desirable option (when available), as it is commonly used throughout the world for transactions and the user experience is similar to SMS. SMS is a last resort option due to limitations discussed above. IVR is deemed too difficult and costly to use in most circumstances.

2. *Become better consumers and managers of service providers*

Establishing mobile voucher programs requires a voucher platform provider, such as Transversal. Selecting this partner is an extremely important decision and may require several weeks of market research and bid analysis. Selecting the right partner and establishing clear customer service and support protocols from the beginning will contribute to a productive partnership and voucher experience.

Important questions to ask when selecting a voucher platform provider include:

- Does the provider have experience with mobile voucher programs for humanitarian or development organizations? How many different mobile voucher programs have they managed, what size were they and in how many different contexts? Do they understand and have systems that can accommodate donor accountability and compliance needs?
- Do they provide references from previous users?
- Do they have an existing online management platform? Can you see and test it before signing a contract?
- What does the provider consider “in” or “out” of scope?
- Will they handle all steps of the vouchers? Will any additional contracts and negotiations be required (for example with SMS aggregators?)
- If additional contracts are required, will they handle troubleshooting with actors like SMS aggregators or will that be Mercy Corps’ responsibility?
- Do they offer back-up servers or contingency plans in the event of server system failure?
- Do they offer standard contracts and service level agreements?
- How expensive is the service and what are charges for changes or modifications to the platform?

Once a provider has been selected, developing a clear contract is the next step. Contracts should:

- Clearly outline the end user experience (transaction flow).
- Clearly outline what is included in the online management platform and how that information will be presented (through screen shots or wireframes if the platform does not exist).
- Outline testing processes – including assurance that no modifications will be made to a system after final testing by Mercy Corps.
- Outline support and service procedures, including support hours, contacts and minimum response times. Access to a single point person is highly preferable over a ticketing system.
- Describe the exact information available through reporting functions, as well as presentation of that information. Is it something seen when you simply log onto the platform? Or do you have to query a CSV or XML file? How comprehensive is the report; will it work for multiple functions?

Testing is another important phase. Rigorous testing processes can help reduce errors. Suggested guidelines for testing include:

- Test components separately (i.e. mobile voucher platform/ SMS aggregator services).
- After testing components separately, integrate and test whole system.
- Test in locations with strong and weak signal strengths.

- Test at peak hours during the day.
- Simulate real operating environment as much as possible.
- Do “happy path” testing (where everything works according to plan) but also simulate problems.
- Make a test plan with expected results, record errors, and then retest where errors occurred.
- Consider using testing tools to widen simulation circumstances (software exists to replicate stress/load testing).
- Build in time for beta tests.

3. Use available information to improve program quality and management

Using electronic platforms for vouchers provides access to a large amount of data that can be used to improve program quality and communication with beneficiaries and community members. However, that data must be organized and presented in a way that is useful to program staff.

In the Nepal pilot, MerchantPRO and SMS aggregator reports provided a significant amount of raw data, but Mercy Corps had to sift through that data to make use of it. For example, when a beneficiary had trouble redeeming a voucher, program staff had to log onto the MerchantPRO platform, download the latest transaction CSV file, and sort through data to find the beneficiary and status of his or her voucher. While this type of cumbersome data management was possible in a small pilot, a larger program would require systems that provide easier access to critical information. For example, we could ask Transversal to provide searchable fields on MerchantPRO that pull up a beneficiary account profile. Beneficiary account profiles could contain all attribute data and interactions with the voucher system.

In addition, collecting beneficiary phone numbers provides an opportunity to increase communication with beneficiaries and even provide useful information to them. If a broadcast mechanism via SMS was built into a platform, it would provide rapid communication options with groups of beneficiaries in the event of program issues or changes, or to transmit public safety announcements.

4. Beneficiary access: design for the hardest to reach, and create systems to accommodate those who cannot use the system

A key requirement for mobile voucher systems is that they are easy to use by the intended beneficiaries. The Nepal pilot showed us that typical beneficiaries, with limited literacy, numeracy and technology skills, have difficulty completing even basic transactions. PIN entry via SMS and smartphone touchscreen was simply too complicated for this group to complete independently. Future systems should be designed with this population in mind, prioritizing the simplest possible transaction with minimum reliance on actions from the beneficiary. Other eVoucher implementers (including CARE and the World Food Program) have experienced similar difficulties with PIN entry, indicating that these difficulties are widespread and should be avoided when alternate authentication methods exist (such as voucher cards with scanable barcodes, etc.). Designing solutions that place the bulk of the transaction steps on the vendor (as opposed to beneficiaries) is preferable, as vendors are fewer in number and easier to train, and also generally have higher education levels and exposure to mobile phones.

Simplifying transactions will make redemption of mobile vouchers more accessible in the future but it will not remove the need for some beneficiaries to rely on “helpers” to redeem their vouchers. Even paper voucher beneficiaries often rely on a trusted family member or friend (a “helper”) to redeem vouchers due to mobility or other constraints. Reliance on helpers is likely to increase significantly when

beneficiaries are required to use literacy/numeracy skills to complete a transaction (i.e., type a PIN). As discussed earlier, increased reliance on helpers removes some control over the transaction from beneficiaries and can increase the risk of leakage. While the risk can never be entirely removed, it should be managed and reduced in the following ways:

- Acknowledge the need for helpers and develop clear procedures around helper roles, including who should determine what is purchased, who needs to physically attend the transaction, and who are appropriate and inappropriate helpers. For example, community leaders, vendors and program staff should never be designated helpers due to their relative position of power and influence over the program and participant selection.
- Intensify monitoring efforts when helpers are utilized.
- Formally identify and register helpers, along with beneficiary names. Registered helpers should attend trainings where they learn about program objectives and rules and their role as helpers. They can also then be included in post-distribution monitoring.
- Another option is to potentially reduce or eliminate the need for helpers by choosing beneficiary households by vulnerability, but selecting the person in the vulnerable household with the most experience with mobile phones as the primary beneficiary. However, this could have a negative effect on inclusion and empowerment, and thus should be considered with all benefits and consequences carefully weighed.

The pilot also provided insight into what works well for training beneficiaries on mobile vouchers. Trainings should be highly interactive and provide each participant with an opportunity to observe (and ideally complete) a mock transaction. Small groups may work better than rows of tables/seats so that savvy group members can help others with demonstrations or questions during the training. If transactions require use of vendor or beneficiary phones for SMS or USSD transactions, registered phones should be brought to the training and tested before the training begins.

VI. CONCLUSION

The Nepal pilot offered a successful proof of concept phase, with significant learning about the technical options available for mobile vouchers and their relative advantages and disadvantages. We also learned about barriers facing populations with low education levels, and options to surmount those barriers. Building upon what was learned in Nepal, the next phase will deploy mobile vouchers at scale to victims of conflict and displacement in the Democratic Republic of Congo (DRC). With MasterCard's support, ELEVATE will introduce mobile vouchers in the eastern DRC, which will securely deliver support to thousands of conflict-affected families. We look forward to continued learning on mobile vouchers and sharing results within Mercy Corps, with MasterCard Worldwide, and the wider emergency response community of practice.

VII. ANNEXES

Annex 1: Training Materials

Commodity SMS poster: This poster was hung in stores that accepted commodity SMS vouchers.

मोबाइल SMS मार्फत भौचर प्राप्त गर्ने र खरिद गर्ने प्रक्रिया

पहिलो चरण:
सहभागीहरूले आ-आफ्नो मोबाइलमा खरिद भौचर प्राप्त गर्नु हुनेछ ।

एच वि./लुमन्तीको भौचरको क्रमांक: कृपया यी सामग्रीहरू नबिकको पत्रमाबाट <दिन/घण्टा/मिनेट> विच प्राप्त गर्नुहोस्; २४केजी चामल, ६ केजी दाल, ५ केजी चुरा र ३ लिटर तेल

दोस्रो चरण:
सहभागीहरूले आ-आफ्नो मोबाइलमा खरिद भौचरको मोबाइल नम्बर मार्फत गोप्य पिन (व्यक्तिगत पहिचान नम्बर) प्राप्त गर्नु हुनेछ ।

<नाम> <बरा> मोबाइल नं (मोबाइल नं), कसैको पिन नं <दिन#> हो । कृपया गोप्य राख्नु होला ।

तेस्रो चरण:
व्यापारीले आफ्नो मोबाइलबाट सहभागीहरूले खरिद गरिएका सामानको जम्मा मूल्य र मोबाइल नम्बर राखि SMS लाई ९८०२०८९२६५ नम्बरमा पठाउनु पर्छ ।

बामेट (व्यापारी मोबाइल नं)

चौथो चरण:
सहभागीहरूले आफ्नो मोबाइलमा किन सोजेको हो-होइन मन्ने कुरा सकिने गर्छ आफ्नो पिन लेखेर पठाउनुहोस् मन्ने सन्देश आउने छ ।

के पचाई खरिद पढने सामग्री <पत्रको नाम> बाट किन्ने हुनुहुन्छ । पिन नं लेखेर पठाउनुहोस् । <दिन/घण्टा/मिनेट, समय, टि मार एस बाइ वि XXXXX>

पाँचौ चरण:
सहभागीहरूले आफ्नो मोबाइलमा आफ्नो पिन लेखेर पठाउनु पर्ने हुन्छ ।

पिन<पिन#>

छैटौ चरण:
सहभागी र व्यापारीले एकै साथ आ-आफ्नो मोबाइलमा खरिदको काम सम्पन्न भएको जानकारी खरिद प्राप्त गर्नु हुनेछ ।

MC/Lumanti ko Voucher bare sandesh:
kripaya yi samanharu najikaiko pasal bata
<dd/mm/yyyy> bhitra parpta garnu hola;
25kg Chamal, 6kg Dal, 5kg Cheura, 3Lt Tel

<First name> <Last name> mobile number
<mobile number> , tapaiko pin number
<PIN#> ho. Kripaya gopya rakhnu hola

Basket <participant mobile number>

Ke tapai aafule paaune saman
<Store Name> bata kindai hunuhuncha?
PIN number lekhera pathaunu hosh.
<dd/mm/yy, time, Trx id: XXXXX>

PIN <PIN#>

अथवा

व्यापारीलाई प्राप्त हुने SMS

धन्यवाद ! कृपया परिचय पत्र नम्बर <बाइ वि#> बाट किन्ने सामान विवरणमा । जम्मा भौचर कारोबार नं. <नम्बर> <टाइम स्ट्याम्प> <टि मार एस बाइ वि#>

Dhanyabad !

Kripaya parichaya patra number
<ID #> bahak lai saman dinu hola.
Jamma voucher karobar Rs
<balance> <time stamp> <Trx ID #>




सहभागीलाई प्राप्त हुने SMS

धन्यवाद ! कृपया आफ्नो सामान (पत्रको नाम) बाट किनियोस् । <दिन/घण्टा/मिनेट>, <टाइम स्ट्याम्प> <टि मार एस बाइ वि#>

Dhanyabad !

kripaya aafnu saman
<shop name> bata linu hola.
<dd/mm/yy>, <time stamp>,
<trx ID #>

Electronic Voucher Assistance (ELEVATE), Kathmandu Pilot
MercyCorps Nepal, Sanepa Chowk, Lalitpur, Nepal, P.O.Box 24374,
Phone: +977 1 5012571/ 5555532, Fax: +977 1 5554370

Training Flyer: This flyer was distributed to beneficiaries and outlined program rules and voucher redemption steps.

प्रथम चरण:
तपाइँले आफूले प्रयोग गर्दै आएको मोबाइल फोनमा एउटा सन्देश (एस.एम.एस.) प्राप्त गर्नुहुनेछ, जसमा तपाइँले पाएको सन्देश (एस.एम.एस.)को सहयोगबारे लेखिएको हुनेछ। यसमा मिति पनि उल्लेख गरिएको हुनेछ, जुन मिति भित्र देखावटका सामान वा पैसा प्रयोग गरि सक्नु पर्ने हुन्छ।

दोस्रो चरण:
विद्युतको सहायताको दुरुपयोग नहोस भन्नाको लागि चार अंकको व्यक्तिगत पहिचान नम्बर (पिन नं.) भएको अर्बो एउटा एस.एम.एस. तपाइँले प्राप्त गर्नुहुनेछ। यो नम्बर गोप्य राख्नु पर्ने छ।

तेस्रो चरण:
तपाइँले प्राप्त गरेको पहिलो एस.एम.एस.लाई (जसमा प्राप्त गरेको सहयोगबारे लेखिएको हुन्छ) नजीकैको पसलमा देखाएर साहूजी/साहूनी मार्फत उल्लेखित सामानहरू लिनु पर्ने हुन्छ। रकम उल्लेखित सन्देश भएमा साहूजी रकम बराबरको सामानहरू खरिद गर्नुपर्ने हुन्छ।

चौथो चरण:
साहूजी/साहूनीले तपाइँको एस.एम.एस. भौचर हेर्दाछि उल्लेखित सामान मोबाइलमा केही सन्देश नम्बर ९८०२०८१२६४ मा पठाउनु हुनेछ। लेखिने सन्देशको लागि विस्तृत चार्ट हेर्नुहोला।

पाँचौं चरण:
तपाइँले पाउँदा पसलमा छुट्टा नै आफ्नो मोबाइलमा अर्को सन्देश प्राप्त गर्नु हुनेछ, जसमा तपाइँलाई आफ्नो व्यक्तिगत पहिचान नम्बर (पिन नं.) नम्बर सन्देश पठाउन भनिने छ।

छैटौं चरण:
यदि सबै प्रक्रिया सही-सही सम्पन्न भएमा त्यसको सगरी तपाइँ र साहूजी/साहूनीको मोबाइलमा एक-एक सन्देश प्राप्त हुनेछ, जसमा कारोबार सम्पन्न भएको जानकारी हुनेछ।

माथि उल्लेखित छ-बटा चरणहरूलाई राम्ररी बुझ्नु जरुरी हुन्छ। प्रत्येक चरणलाई सावधानीपूर्वक सम्पन्न गरे कुनै रोकबाट वा समस्या हुने छैन। कुनै कारणवश प्रकृया अवरुद्ध भएमा वा गलत सन्देश पठाएमा, त्यसको सगरी तपाइँको मोबाइलमा प्रकृया गलत भएकोबारे सन्देश प्राप्त हुनेछ। यसो सन्देश प्राप्त भएमा सम्पूर्ण प्रकृयालाई पुनः दोहोर्याउनु पर्दछ। सल्लाह र सुझावको लागि त्रिपुरा सहकारीका कर्मचारी वा सुमन्ती वा भर्तीकोरक कर्मचारी मार्फत बप जानकारी लिनु सकिनेछ।

यो उक्तरीमा सामान किन्ने जस्तै हो। सन्देश मार्फत आफूले पाएको सामानको मूल्य सहभागीहरूले पसलमा तिर्नु पर्दैन। पसलले पाउनु पर्ने बिक्री बराबरको रकम बेग्लै प्रकृयाबाट पसलसँगको सम्झौता अनुसार उपलब्ध गराइनेछ। पसलहरूलाई यो प्रक्रियाको अग्रिम जानकारी गरिनेछ।

सहभागीहरूले मोबाइल सन्देश (एस.एम.एस.)मा उल्लेख नगरिएका सामानहरू वा तालिमको दौरान किन्न नपाउने भनिएका सामानहरू आफूभित्रै खरिद गर्ने वा अर्को सामान संग साटन पाउने छैन। उल्लेखित बन्दा फरक सामानको कारोबार गैर कानूनी मानिने छ।

कार्यक्रमबारे सूचना र गुनासोको लागि
यस फोन नम्बरमा सम्पर्क गर्नुहोला
९८४१०-१४०८२

Electronic Voucher Assistance (ELEMATE), Kathmandu Pilot
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P.O. Box 24374,
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मोबाइल एस.एम.एस. मार्फत भौचर प्राप्त गर्ने र खरिद गर्ने प्रक्रिया

MercyCorps ELEMATE

भर्तीकोरक नेफ्ल र सुमन्तीले मोबाइल फोनबाट सन्देश पठाउन प्रयोग हुने एस.एम.एस. प्रविधिको आधारित एक परिवार कार्यक्रमको लागि यस समुदायका १० घर परिवारको लागि धेरै परिस्थितिगत सहयोग उपलब्ध गराउने नक्कल राखिएको छ। करिब २ महिनाको अवधिमा यस परिवार कार्यक्रमले एस.एम.एस.मा आधारित प्रविधिको उपयोगिता, प्रभावकारिता, खरिदोपमा, सुलभता र विश्वसनीयता जस्ता कुराको लेखबिबा गरीन्छ। यस परिवार कार्यक्रमले समुदायका संश्लिष्ट परिवार र छुट्टी भएका पसलहरूसँग भिन्नेर काम गर्नेछ। यहाँ भौचर भन्नाले एउटा सन्देश जसमा उल्लिखित परिवार (सहभागीले) पठाउने सामान र रकमको विवरण र प्रयोग गर्नुपर्ने समय तथा सिमा उल्लेख गरिएको हुन्छ भन्ने बुझ्नुपर्छ।

सहभागीको आफ्नो मोबाइलमा एस.एम.एस. सन्देशको माध्यमबाट माथि बताइए जस्तो सहयोग स्वल्प प्राप्त हुने सामानको नाम तथा परिमाण वा तोकिएको रकम लेखिएको भौचर प्राप्त भएपछि उक्त सामानहरू पसलबाट खरिद गर्ने प्रकृयाको सविस्तर वर्णन यस प्रकार छ।

सहभागीले आफ्नो मोबाइलको एस.एम.एस. भौचर खरिद गर्ने हुन्छ।

साहूजीले सहभागीको माग बमोजिम आफ्नै मोबाइलको एस.एम.एस. सन्देश पठाउनु पर्ने हुन्छ।

दुई जनाले तत्काल कारोबार सम्पन्न भएको जानकारी प्राप्त गर्ने हुनेछ।

कारोबार सम्पन्न भएपछि सहभागीले आफ्नो सामान लिने।

सहभागीले पसल गर्ने आफ्नो मोबाइलको एस.एम.एस.मा पिन नं. तथा सन्देश पठाउने।

कारोबार सम्पन्न भएपछि सहभागीले आफ्नो सामान लिने।

Annex 2: Technology Costs

The total costs of mobile voucher services were \$9,649 USD. These costs include charges for use of the MerchantPRO platform (which allowed Mercy Corps to distribute, manage and monitor vouchers through an online dashboard), as well as SMS charges. As Transversal (the owner of MerchantPRO) was aware that this was a pilot project with potential for future deployments and business opportunities, they were willing to negotiate and offered a “pilot” price (meaning that they may charge higher rates in the future). The MerchantPRO costs were substantially lower than other companies, who typically quoted between 60- \$110k to develop a mobile voucher platform from scratch, and around \$25-50k to customize an existing mobile voucher platform. Detailed cost breakdowns are presented below:

Total Costs Test 1: SMS voucher via MerchantPRO + longcode SMS services from txtNation: \$3,369

- TxtNation aggregation services: \$278
- Roaming charges from Ncell (Nepal mobile network): \$241
- Half of MerchantPRO’s platform costs: \$2,850

Total Costs Test 2: SMS voucher via MerchantPRO + shortcode SMS services from Tivre: \$5,630

- Half of MerchantPRO’s platform costs: \$2,850
- Tivre SMS aggregation services: \$3,280

Test 3: Smartphone test: \$150 USD³

³ MerchantPRO allowed us to test this application free of charge; the only costs were purchasing two smartphones for vendors)