A CRS community mobilizer uses a fingerprint scanner for beneficiary e-voucher registration. With e-vouchers, people can purchase food and living supplies, such as jerry cans, soap and cooking utensils.
Photo by Dooshima Tsee/CRS

E-vouchers in Conflict Situations

APPROACHES AND LESSONS LEARNED FROM NORTHEAST NIGERIA (AUGUST 2016 - SEPTEMBER 2017)

I. OVERVIEW

This case study presents a detailed description of the utilization of electronic vouchers (or e-vouchers) for the delivery of emergency relief. In these pages, we hope to provide a snapshot for humanitarian response peers on best practices, lessons learned and recommendations for the implementation of e-voucher programming during an emergency response, based on projects carried out by Catholic Relief Services (CRS) and implementing partners (IPs) in support of internally displaced persons (IDPs) and vulnerable host communities in Northeast Nigeria. The following principles and practices can be adapted to diverse contexts, and may be particularly useful in areas with limited connectivity, volatile security and physical accessibility, as well as in regions where markets are active, through the setup of a closed-loop system.[1]

II. CONTEXT

Now in its eighth year, the Lake Chad Basin crisis spans the countries of Cameroon, Chad, Niger and Nigeria. In Nigeria alone, it is estimated that the conflict has affected 14 million people, including

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1   A closed-loop system is a system in which the institution that issues the payment card is the same institution that provides the acquiring infrastructure, and in which the card or password can only be used on the acquiring infrastructure of that one institution.

faith. action. results.

Areas where CRS is currently supporting families through e-vouchers.
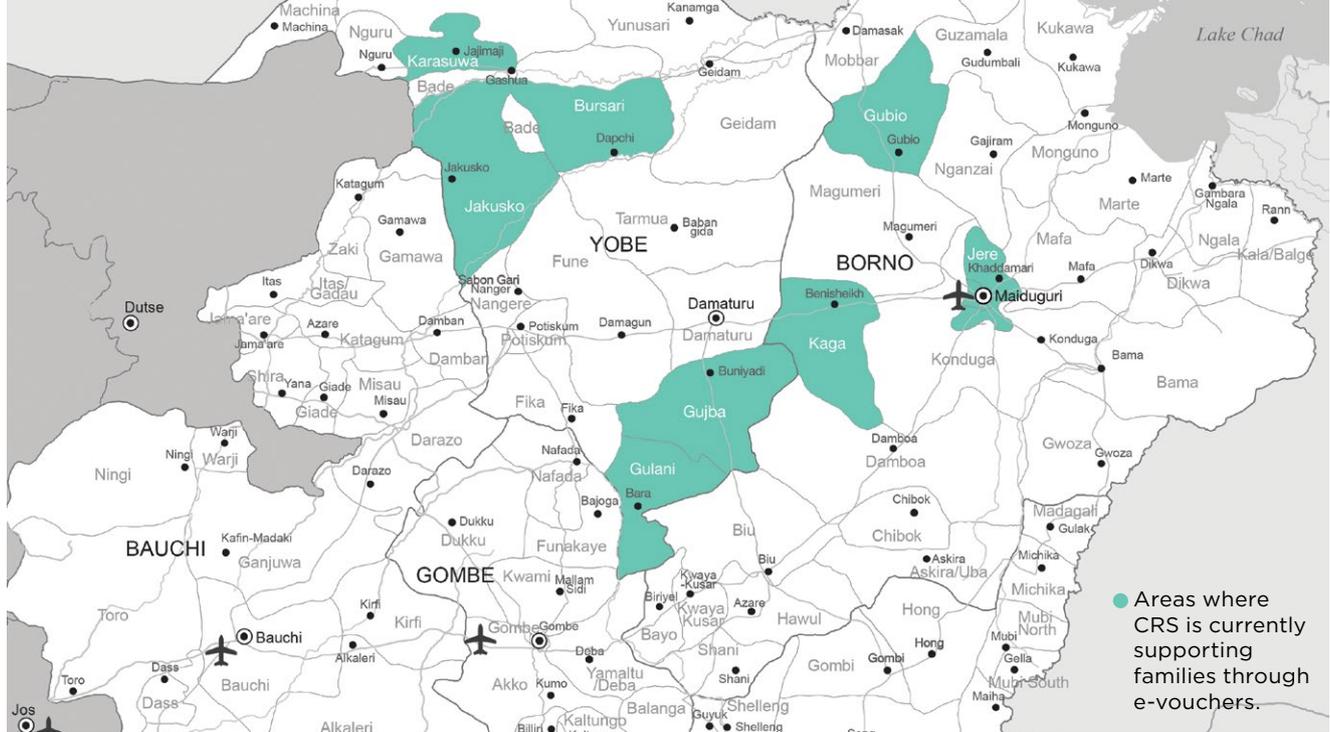
8.5 million people living in Nigeria's Adamawa, Borno, and Yobe states, and resulted in the deaths of 200,000 people.[2] Due to the continued violence perpetrated by both non-state armed groups and government forces, thousands of families have been forced to flee their homes; despite some improvements in recent months, many areas in the Northeast remain inaccessible to humanitarian assistance. With 4.7 million people in need of emergency food assistance in Borno, Yobe and Adamawa states,[3] food is the most pressing unmet need. At the same time, families are in dire need of water, hygiene and sanitation (WASH), shelter and non-food items (NFIs). Ongoing conflict has disrupted trade, seriously hindered access to basic services, and limited agricultural and other livelihood activities.

CRS reestablished its presence in Nigeria in 2000, and has since worked with local partners in 32 of the country's 36 states, leveraging their extensive grassroots networks and capacity to reach the rural poor. Working in 13 Local Government Areas (LGAs) of Yobe State, CRS has been providing a multi-sectoral emergency response, including WASH, polio and routine immunizations, and emergency food assistance programming for conflict-affected communities since 2014. In July 2016, CRS launched operations in Borno State

providing vulnerable households (HHs) with immediate relief through integrated programming aimed at addressing families' food, non-food items (NFIs), WASH and shelter needs.

III. WHY CASH-BASED PROGRAMMING?

Since the early 2000s, the delivery of humanitarian assistance has increasingly shifted from the provision of in-kind commodities, such as food, NFIs, shelter material or seed and tools, to the utilization of vouchers or direct cash to link beneficiaries to goods and services.[4] **The value of cash transfer programs (CTP) between 2009 and 2013 is thought to range between $692 million and $1.5 billion, depending on the sources, and represent 1.5 to 3.5% of international humanitarian assistance reported.**[5] Vouchers, whether in paper or electronic form, represent one type of cash-based response, allowing beneficiaries to exchange their vouchers for an array of goods (typically preselected by the organization) through approved vendors operating in the local market, or through specially organized voucher fairs, where vendors are brought together for a limited time to sell goods in exchange for vouchers. CTPs can

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2   ACAPS (March 2017). Country Profile: Nigeria

3   FEWSNE (March 2017). Situation in Northeast Nigeria.

4   The utilization of cash to support disaster-affected families can be traced back to 1870-1871 and the Franco-Prussian war, 19th century India in response to famine, and the 1980s in Botswana. However, the rate of C&V projects significantly increased after the 2004 Indian Ocean tsunami. ODI (March, 2015).

5   ODI (March, 2015). Cash transfer programming and the humanitarian system.

include a conditionality (e.g., beneficiaries need to fulfill an objective prior to receiving assistance) or restriction (e.g., limiting the quantity or type of what can be purchased or when). On the one hand, evidence highlights that in many contexts CTPs are not only appropriate and a better solution to in-kind assistance, but have multiplier effects on local economies and markets. They allow beneficiaries greater choice and control, and are often cheaper and faster to implement since they rely on existing and diversified vendor procurement networks instead of newly implemented humanitarian pipelines for food or other goods. On the other hand, when markets are too weak or operate in areas of high insecurity, CTPs might not be the most appropriate response as they could lead to inflation, protection risks and programmatic delays, rendering direct assistance the preferred method.

IV. E-VOUCHERS IN NORTHEAST NIGERIA

In 2014, CRS began to look at best ways of providing food assistance to conflict-affected populations in Yobe State, including leveraging existing market capacity. Paper vouchers for the delivery of food were initially deployed, but these were found to be inadequate as they required extended physical presence of program staff in targeted areas to implement and monitor activities, and security concerns made this challenging. Like direct distributions, paper vouchers would have required gatherings of large crowds monthly to ensure the delivery of the paper vouchers, potentially rendering beneficiaries soft targets for violence or extortion. Furthermore, CRS experience in Nigeria and globally has illustrated that the constraints in using paper vouchers are many: printing, distributing and reconciling paper vouchers are all time-consuming and costly. Fraud and duplication of paper vouchers remain challenges, despite improved technology and design and the reinforcement of internal controls and security mechanisms. Fairs also mean that households are forced to spend all of their vouchers in one day, with family members often waiting long periods of time to access fair sites, or undertaking long, expensive and sometimes dangerous journeys to and from distribution sites. One-off cash injections through paper vouchers can also result in the resale of goods purchased by beneficiary households to cover other pressing needs. Finally, collecting accurate data on key indicators—including household purchasing patterns and actual traded commodity prices—remains a challenge because

Hamsatu Adamu, 45 , and her daughter Fatima, 15, prepare food they received through a CRS program in Dapchi, Busari LGA, Yobe state. The CRS Emergency Food Security program in Borno and Yobe States is funded by USAID's Office of Food for Peace. In the project, CRS implements an e-voucher distribution program for staple and fresh foods. Food vouchers are redeemable with a range of participating vendors that stock a variety of foods, which enables dietary diversity, promotes choices, and responds to beneficiary preferences. *Photo by Dooshima Tsee/CRS*

paper voucher spending is hard to track, and relies on vendors to record sales or staff to monitor everything. CRS initially started food security programming in Yobe using paper vouchers, but switched to e-vouchers because of the enormous logistical demands of paper vouchers. Direct cash was not an option because of the security risks, particularly during distribution to beneficiaries.

To ensure the rapid delivery of emergency food assistance and overcome obstacles linked to access, security, fraud and data, CRS launched a pilot project targeting Bursari and Geidam Local Government Authorities (LGAs) that reached 3,346 food insecure households (HHs). CRS thus became one of the first agencies to deploy e-vouchers utilizing smart card technology in Yobe State.

V. CASE STUDY OBJECTIVES AND METHODOLOGY

In line with its global Agency Strategy, CRS' emergency programs in Nigeria seek to leverage Information and Communications Technology for Development (ICT4D) for improved operational and programmatic results, while privileging market-based interventions for communities' immediate and long-term recoveries. This case study aims to capture some of the key lessons learned, best practices and innovations stemming from CRS e-voucher programs in Northeast Nigeria. Through a review of existing program reports, interviews with program and

partners staff, as well as beneficiaries and vendors,[6] it sets out to explain: (i) the process for the deployment of e-vouchers for the delivery of commodities, (ii) the added values and innovations arising from the utilization of e-vouchers, and (iii) lessons learned and recommendations for future programming. While quantitative data stems from program monitoring and evaluation exercises, anecdotal data has also been referenced in this case study.

The study focuses on the integration of e-vouchers and related smart card technologies with multiple wallets for the delivery of emergency assistance, including food, NFIs, seed and tools, between August 2016 and September 2017. However, the case study does not focus on general aspects linked to cash-based program management and planning, nor is it an evaluation of the response's impact or success.

VI. HOW E-VOUCHERS WORK

A. THE TECHNOLOGY

The Cash and Assets Transfer (CAT) Management Platform is a web-based platform for the delivery of commodities and services. More specifically, it acts as a data management system for information gathered during the design, distribution and monitoring of cash and asset transfers. The CAT system supports Country Programs (CPs), including Nigeria, in collecting, analyzing and managing data during the different phases of a cash or asset transfer program (Figure 1). CAT is made up of one global dashboard that is fed data from the different dashboards used by projects and CPs. In the case of CRS' program in Nigeria, a closed-loop system was set up employing the following software:

- *CAT platform:* A web-based information management system that is used to manage the complete program life cycle, including the assessment, targeting, registration, distribution and monitoring phases of a project. The CAT platform records all distributions to beneficiaries and transactions between project participants and vendors.

- *RedRose ONEapp:* A multipurpose application for android devices used by vendors or money agents or at distribution sites for processing beneficiary transactions; available both offline and online.
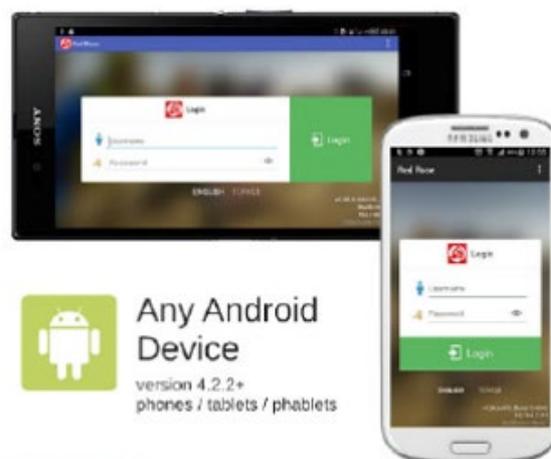
Any Android Device
version 4.2.2+
phones / tablets / phablets

NFC
Near Field Communication
for e-Voucher Projects

3G, Wi-Fi, GPS, Bluetooth all utilized

- *RedRose Collect:* A data collection application for android devices[7] used by field staff for beneficiary registration (including biometrics), surveys, complaints, cash for work or training attendance, on-site tracking and monitoring; available both offline and online.

- *Pentaho:* A customizable data analysis software that allows staff to review and analyze all data collected through the project to inform program activities and assess progress.

- *Near field communication (NFC) technology:* A form of contactless communication between devices, such as android smartphones and smart cards, embedded with an NFC chip. Similar to Bluetooth technology, contactless communication allows a user to touch the smart card to an android phone, which in turn reads and writes to the smart card. Additionally, this allows devices sharing the RedRose ONEapp to connect to each other for peer-to-peer syncing, which is used in situations where the market area does not have mobile or internet connectivity.

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6 Interviewees were identified through voluntary sampling methodology.

7 Compatible with ODK and XlsForm.

Figure 1. CRS CAT Platform
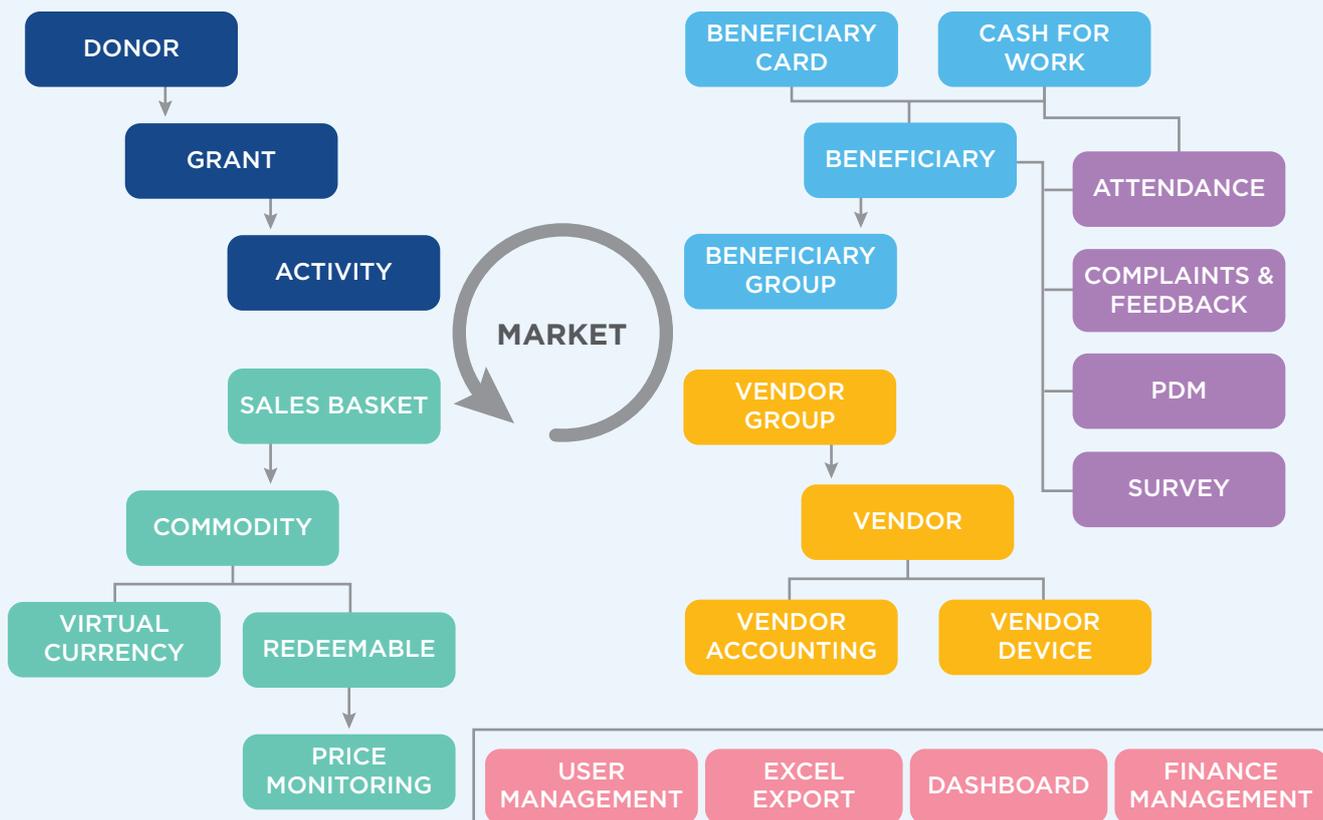
Explanation of Figure 1: The CAT platform provides a centralized system from which teams can control, manage and monitor:

- **Donor and grant information**: financial data for the project(s) is uploaded to the system to allow staff to quickly reference and track approved budgets for each activity against expenses.

- **Beneficiary and vendor data**: information (at both individual and group levels), includes demographic and geographic data, transaction histories, surveys and monitoring data, and changes over time.

- **Market data**: includes all goods and services approved by the program, with measurement units, maximum and minimum prices, photos, and names in local language. The platform allows for the analysis of transaction and market data for each item, including product popularity, sale prices, etc.

The CAT platform also supports segregation of duties with different access rights for various users, including vendors, community-based staff, project managers, finance, MEAL staff and senior management, to access relevant data and carry out specific functions, such as technical support to vendors and beneficiaries, during sales periods, vendor payments, disbursements to beneficiaries, monitoring and reporting.

Community mobilzers go door to door to screen and capture biometric data for beneficiary registration for a food assistance program.
Photo by Dooshima Tsee for CRS
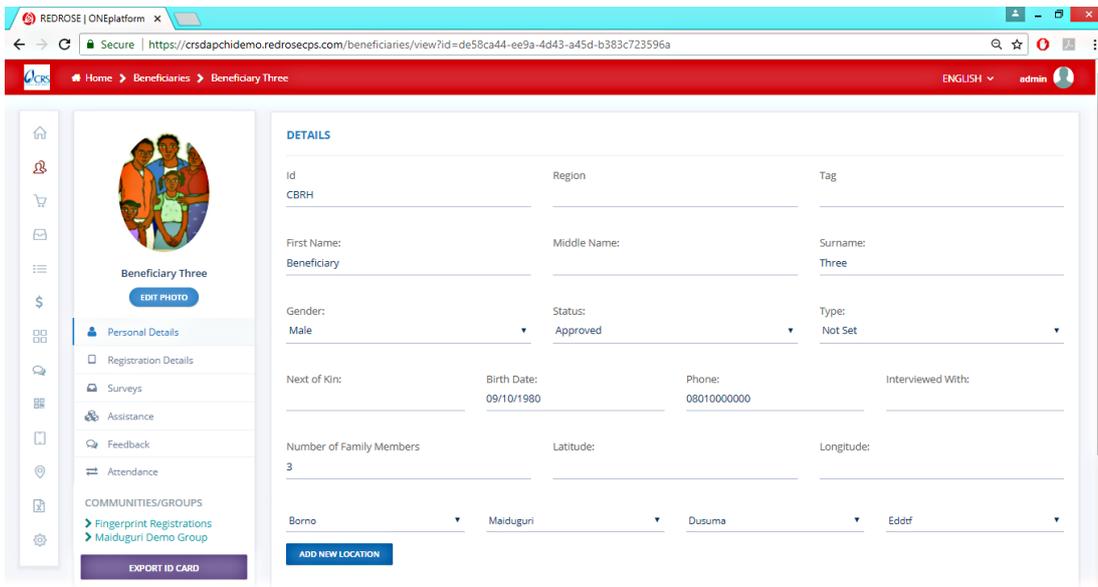
Example of a Beneficiary Profile Page
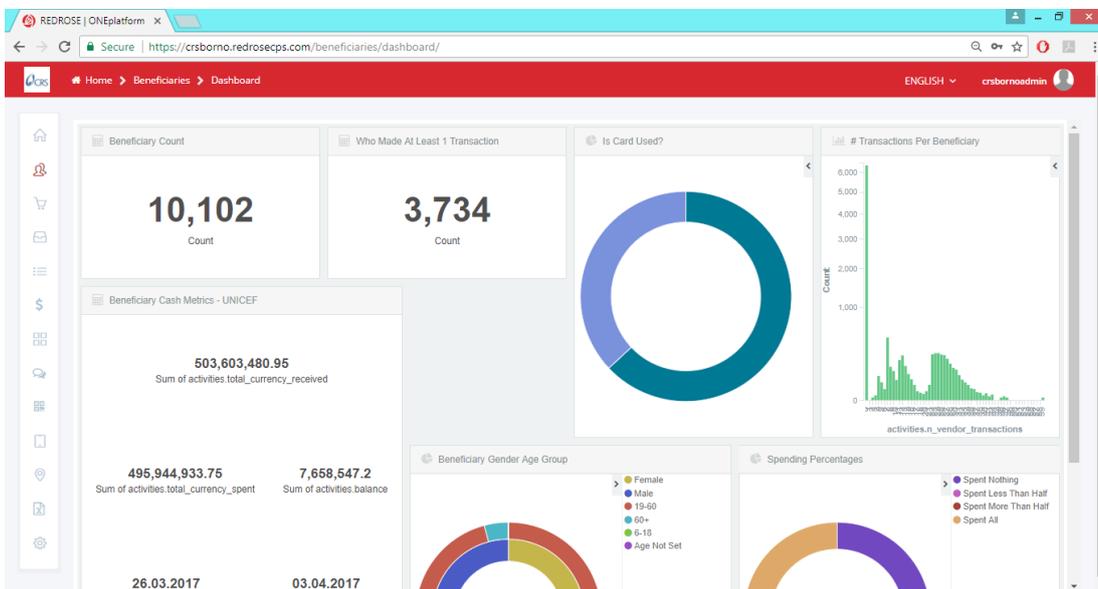
Example of a Beneficiary Dashboard

Screenshot of Vendor List
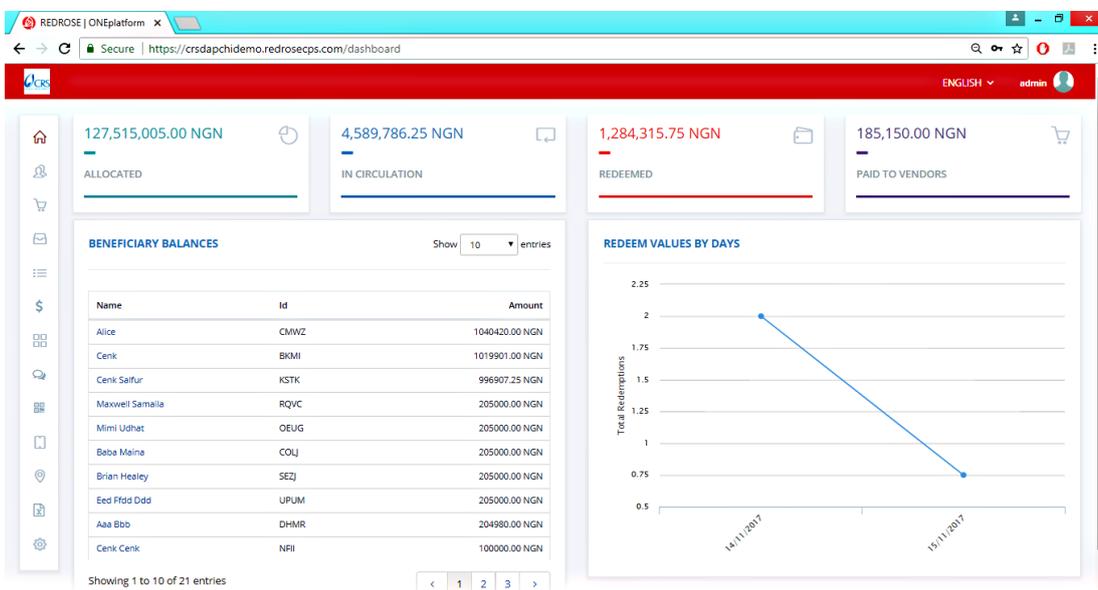
Screenshot of Market Dashboard

Screenshot of Beneficiary Transaction History

The hardware utilized for the project included:

- Mobile Bluetooth printer, with rechargeable batteries and printing paper
- Near Field Communication-enabled (NFC) android devices
- Portable solar chargers and batteries
- NFC-enabled smart cards with electromagnetic chips
- Fingerprint biometric scanners

B. IMPLEMENTATION

Registration. Conflict-affected families are registered by program and partner staff, who collect key information linked to HHs' demographics, GPS coordinates, food insecurity levels and other program criteria and indicators. Fingerprint, GPS points and photos are also captured for the HH representative, while key data for a second household representative (a proxy), in case the primary HH representative is unable to go to the market, is also registered. Selected beneficiaries receive smart cards.

Simultaneous to beneficiary registration, selection and card distribution, project vendors are selected through an open application and due diligence process. Applicants are solicited through an expression of interest similar to a procurement tender, and are often supported by vendor education sessions or other outreach to explain the program requirements, expectations and benefits of participation. The process differs from a competitive procurement tender in that all vendors who meet program requirements are accepted, since the greater the number of vendors, the greater the competition, which empowers beneficiaries to shop around for best quality, treatment and price. Vendors are assessed and selected based on the quantity and quality of their current stock; their capacity to increase stock in response to increased demand; their willingness to agree to program requirements like selling on credit and allowing up to a 10-day processing time for payments, abiding by the CRS Code of Conduct, and selling at fair market prices; and their technological literacy or ability to use the program's technology. Selected vendors sign contracts agreeing to program rules. Vendors then attend training on the program, beneficiary rights and how to use the technology. Vendors each receive handheld Point of Sales (POS) terminals, which are android devices (smartphones) loaded

Printer and Finger print scanner

with the RedRose ONEapp, plus Bluetooth printers, biometric readers and solar chargers with batteries.

Platform setup and training. The CAT platform is adapted to meet programming needs, including the creation of product lists specific to the project activities and locally available products. Project participants learn about their entitlements, their rights at vendor shops (such as the right to know price ahead of purchase, to negotiate and to choose where to shop) and how to use their cards during outreach sessions before each voucher disbursement. Vendors and their assistants receive training and attend regular meetings over the course of the program to review the technology and ensure continuous fair treatment of beneficiaries, including reinforcing the importance of fair market prices and respecting beneficiary rights. In addition to in-person trainings, beneficiaries and vendors receive orientation pamphlets demonstrating, in local languages with accompanying images, how to use smart cards, access assistance, and report any complaint or feedback.

Asset transfer. On the day of disbursement, beneficiaries' cards are topped with funds disbursed through the platform, which allows them to purchase food and other items from participating vendors. In the case of the CRS FFP project, disbursements take place monthly, and each individual receives between $5.52 and $6.54, depending on location and local market prices.[8] This top-up process is done online, and vendor

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8   Transfers cover approximately 60% of the cost of a nutritionally adequate diet, and are calculated based on a 2,100 KCAL/day/person diet.

FACTS AND FIGURES—SEPTEMBER 2017

PROJECT LOCATIONS
Yobe and Borno states, Northeast Nigeria

NUMBER OF PROJECTS 8

DONORS
FFP, OFDA (2), ECHO, O'Neil Foundation (2), LDSC and CRS Private Funds

UNIQUE BENEFICIARY HHS ASSISTED
8,160 in Borno (since 2016)
13,406 in Yobe (since 2015)

PARTICIPATING VENDORS
67 in Borno
113 in Yobe

TARGETED MARKETS*
Borno **Monday, Bollori Store, Muna and Gamborou Markets, Gubio Markets**
Yobe **Dapchi, Bayamari, Garin Alkali, Geidam, Jakusko, Karasuwa, Gulani and Gujba Markets.**

Many vendors operate from their homes and not from shops in central markets.

CASH INJECTED
**$2,945,346 in Borno**
$5,373,123 in Yobe

CASH REDEEMED
$2,492,657 in Borno
$4,419,753 in Yobe

devices either need to connect to the internet to sync, or field staff devices already synced in an internet zone are available in the field for peer-to-peer syncing. To carry out a transaction, vendors use their phones to swipe beneficiary cards, then select the commodities requested by the beneficiary and enter the unit, quantity and unit price for each purchase. Vouchers are deducted from the smart card balance only after the beneficiary authorizes the payment and purchase following verification of the beneficiary's identity with the photo and name on the card, or with a fingerprint scan if biometric verification is enabled. Transaction data is uploaded in real time on a central cloud-based platform using the phone's internet connection, or by synchronizing with a central phone through peer-to-peer syncing technology. At the end of each transaction, the vendor prints two copies of a receipt: one is given to the customer (beneficiary) and one is kept by the vendor.

Vendor payments. Vendors are paid on a bi-monthly pay period schedule or following disbursements if there is no established schedule. Vendors sync their devices using internet or peer-to-peer technology, which allows CRS staff to create a transaction summary for that pay period on the CAT platform. Vendors also turn in their paper receipts for this period, which allows for comparison between the vendors' record and the online platform. Occasionally devices break or syncing errors prevent transactions from being recorded on the CAT platform, so the paper trail enables CRS staff to investigate and respond to individual cases. CRS staff prepare a payment
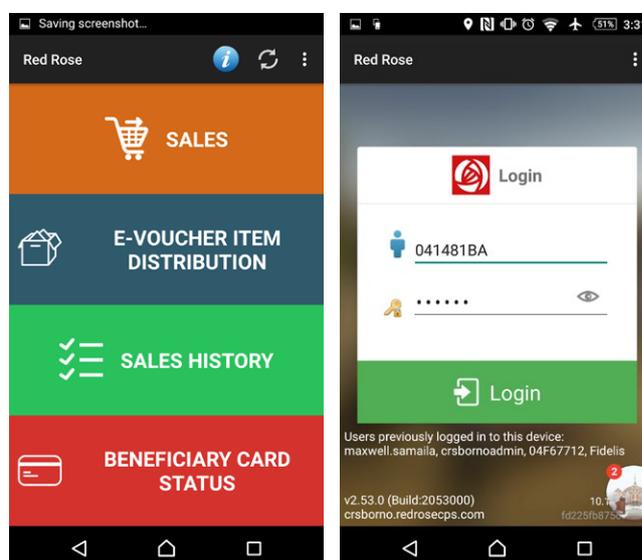
Vendor's homescreen and Vendor Login

request using CAT data as payment justification. In the future, bank accounts may be linked to the CAT platform, enabling CRS to submit payments directly within the system.

Monitoring, Evaluation, Accountability and Learning (MEAL). Throughout project implementation, the MEAL team carries out on-site and post-activity monitoring, collecting information on beneficiaries' satisfaction levels, utilization of e-vouchers, usage of the assistance and intended results from the support provided. Spot checks and secret shoppers permit MEAL to ensure vendors respect program rules and beneficiary rights. Regular data analysis results in the identification of trends and challenges in project implementation, enabling staff to make real-time project management decisions. Furthermore, CRS and its partners use the CRS price monitoring

Figure 2. E-voucher implementation process

MARKET PRICE MONITORING

| Platform setup and creation | Printing of beneficiary and vendor smart cards | Signature of vendor contracts | Carry out vendors' sales reconciliation and payment |

| Beneficiary and vendor identification, registration and selection | Orientation, training and sensitization of beneficiaries, vendors and program staff | Disbursement of assistance to beneficiairies' smart cards, monitor transactions, and handle complaints |

package, MARKit, to collect market price data, and monitor significant changes before, during and after the intervention in both participating vendor shops and control markets, to:

- React in real time to significant outlier prices at specific vendors' shops;

- Follow up with vendors on price trends after each disbursement to compare program vendors and overall market prices;

- Assess project impact on local markets in terms of type of commodities, price and availability, and identify spillover effects, such as inflation;

- Analyze what, if any, program modifications are necessary to ensure healthy market function.

VII. KEY RESULTS

To date, CRS and its partners have delivered food, agricultural seeds and tools, living and hygiene supplies, and cash assistance to 83,000 people. This support has been possible thanks to funding from (USAID) Food-For-Peace (FFP) and the Office of US Foreign Disaster Assistance (OFDA), the European Union's (EU) European Civil Protection and Humanitarian Aid Operations (ECHO), the Latter Day Saints Church (LDSC), the O'Neil Foundation and private donors. These programs have taken place in 5 LGAs in Yobe and 3 LGAs in Borno States.[9]

E-vouchers have:

Ensured access to key commodities. Beneficiaries have purchased food, agricultural seeds and tools,
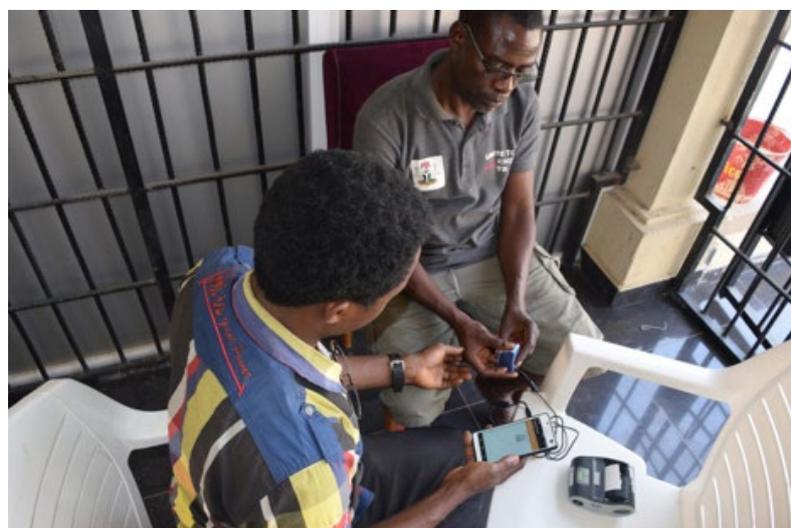
Vendor capturing beneficiary fingerprints for transaction (Demo)

and NFIs, such as cooking sets, soap, menstrual hygiene kits and household goods, including mattresses and water storage containers from 180 vendors in more than 12 markets. Purchasing pattern data shows that in terms of top commodities (by number of unique households purchasing that item), the most popular food purchases included milk, oil, rice, beans, maize, pasta, groundnuts and the seasonings salt and Maggi cubes. Purchasing patterns between men and women did not vary greatly, with the exception that men seemed to prioritize the purchase of maize more than women. In terms of NFIs, buckets, sleeping mats, soap, jerry cans and cooking sets were among the most frequently purchased items. To date and on average, families visited and purchased items from an average of 26 vendors and different boutiques, visiting markets

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9   These include Bursari, Karasuwa, Jakusko, Gujba and Gulani
    LGAs (Yobe State), and Jere and Gubio LGAs (Borno State).

Fatima Ibrahim, 14, washes her hands with soap her family purchased via CRS e-vouchers through a program supported by USAID-OFDA. Using e-vouchers, CRS provides Non Food Items such as jerry cans, soap and cooking utensils to uprooted and other vulnerable households. Beneficiaries also receive improved knowledge of WASH practices. *Photo by Dooshima Tsee/CRS*

most frequently on Friday (in the case of Yobe) and Thursday (in the case of Borno).[10]

Improved nutritional choices. Based on a review of initial purchasing pattern data at the start of food security programming in 2015, CRS and its partners noticed that many of the beneficiaries were not purchasing a nutritionally optimized variety of foods. Program adjustments were made the following month to encourage more dietary diversity. As such, 30% of monthly voucher amounts were partitioned into a macronutrient basket (using a second wallet on the smart cards) which encouraged beneficiaries to purchase macronutrient-rich foods not frequently consumed otherwise. The foods in the restricted wallet were recommended by a CRS nutritionist technical adviser who analyzed gaps in the local diet both pre- and post-crisis, and included millet, sorghum, eggs, milk powder, bread, groundnuts, beans, maize flour, tomatoes, onions, salt and peppers. The two wallets allow families the freedom to choose the foods they prefer, while also ensuring that a foundation of nutrient-rich foods is included in each family's food basket. Purchasing data showed

a shift in participant choice in the direction of improved nutritional adequacy.

Injected cash into the local economy. By the end of September 2017, a total $8,318,469 had been disbursed to selected beneficiaries, who redeemed $6,912,410 (or 83%)[11] through local purchases. Through anecdotal data, we know that because of the project, participating vendors' revenues have substantially increased, resulting in vendors hiring more assistants to support the increase in demand. Keeping businesses alive in areas where a large portion of the population lacks resources to spend in the local economy provides both short- and long-term benefits. This is essential in conflict zones because market resiliency directly affects community recovery rates when conflict subsides.

Tracked project activities. CRS' water, sanitation and hygiene (WASH) team in Yobe used the CAT platform to track the number of individuals participating in hygiene sessions through swiping beneficiary IDs (smart cards). In this program, beneficiaries were required to attend one hygiene promotion session a month to receive NFIs; swiping their attendance also added them to the list for that month's NFI voucher disbursement.

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10 Program teams found that the majority of beneficiaries were likely to spend most of their assistance the day of or the day after the transfer. Thus, this data point is likely to have been influenced by the day on which transfers were made.

11 At the time of writing.

Monitored beneficiary satisfaction. Data from on-site monitoring activities from Borno and Yobe highlight overall high beneficiary satisfaction levels. Of the 1,280 families interviewed during on-site monitoring in Borno State, 98% declared themselves very satisfied with program activities. Similarly, post-distribution monitoring highlighted continued high satisfaction levels: 70% of interviewed HHs stated that they were very satisfied with the assistance received, and 29% were satisfied.[12] In addition to providing families with greater choices of items, quantities and quality to purchase (an added advantage of paper vouchers as well), e-vouchers allow families the flexibility to decide where and when to spend the money.

VIII. WHAT WE LEARNED

A. STRENGTHS AND PROMISING PRACTICES

- *Participant buy-in, dignity and choice.* E-vouchers have been found to promote both beneficiary and vendor satisfaction because they allow for greater participation and choice. Beneficiaries can choose what to buy, when to buy it, and where to buy it, and negotiate prices with vendors as they normally do when spending their own money. "*We have no difficulties reaching the markets, and buying what is needed. This is what we used to do in our home village, and what we do now,*" said Kundil Modu, a father of seven. Moreover, CRS focus groups in Yobe and Borno confirm that women prefer vouchers over food distribution, because vouchers give them the freedom to choose the food items they want to buy, address the women's concerns over cash diversion, allow for purchases in smaller quantities since they're not required to spend the entire voucher at once, and are safer than cash distribution, i.e., do not present the security risks present with a cash distribution system.

- *Female participation.* While research has shown that cash and food vouchers do not necessarily contribute to an improvement in gender relations, roles or perceptions, these modalities have been shown to have a positive impact on women's lives through their increased engagement in HH decision-making and increased sense of being able to feed their families with food purchased locally and per their preferences.[13] Preliminary findings from recent gender and conflict assessments conducted by CRS in areas of intervention have also found that CRS' decision to register each wife as a household head has had positive impacts in terms of women's decision-making power within the household.

- *Streamlined project management tool.* The all-in-one system allows for program and financial management of cash-based responses from beneficiary registration to close out. In comparison to direct distribution activities or paper vouchers, e-vouchers can be more efficient as they greatly reduce operational costs and needs, for example, by limiting/eliminating the need for printing, procurement, transportation, handling, storage and distribution of goods. Similarly, the CAT's financial tracking system allows for a faster, more streamlined financial liquidation process. Finally, through CAT's attendance tracker using smart cards, the CAT platform can be used as an integrated beneficiary management tool for tracking data and participation in different programs, including in-kind distributions and trainings. All data—from registration to MEAL to participation in multiple programs for each beneficiary—can be stored together in the CAT system.

- *Improved effectiveness in MEAL.* The platform allows for the collection of data in real time, the collating of data sets (including registration,

CRS provided trainings to traders on record keeping and the use of the RedRose devices, which resulted in improved entrepreneurship and management skills. One vendor interviewed said, *"Had it not been because of this project, I wouldn't have known how to use these devices. Besides, I have never appreciated the importance of record keeping, but now I understand very well why I need to keep records."*

12 A total of 1,510 HHs partook in post-distribution monitoring.

13 Berg, Michelle et al. *"Examining Protection and Gender in Cash and Voucher Transfers: Case Studies of the World Food Programme (WFP) and the Office of the United Nations High Commissioner for Refugees (UNHCR) Assistance."* WFP and UNHCR, September 2013.

transactions, monitoring and price databases) for improved analysis, and integrates multiple technologies to respond to the varying MEAL needs of the project. Readily available and changeable dashboards provide key information on beneficiaries, vendors, assistance delivered (number of disbursements received by each beneficiary, remaining credits on beneficiaries' cards, etc.) and transactions (type, quantity, unit and unit price of commodities purchased, location and date of purchases, etc.), enabling management to keep programs relevant and fit for purpose.

- **Platform adaptability.** E-vouchers and the CAT platform are easily customizable to programmatic context and needs, thus ensuring that programs remain relevant and fit for purpose. Throughout program implementation, CRS and its partners introduced several modifications, including a nutrient-rich basket for the promotion of nutritious foods, as well as tailoring the food e-voucher value to reflect beneficiaries' actual family size, while standardizing the e-voucher value for NFIs such as cooking sets. Similarly, and to mitigate the effects of currency fluctuations and subsequent spikes in food prices, CRS regularly reviewed data stemming from price monitoring, and adapted the voucher value quarterly in the system as needed to reflect the actual cost of the food basket in current market prices in Nigeria's volatile economy. This was vital in keeping a tab on shifts in prices, and ensured that program activities adequately covered dietary needs as planned, while not adversely affecting market pricing.[14]

- **Value for money.** While this case study does not provide a cost-effectiveness analysis[15] of the system, its highly adaptable platform resulted in important cost savings throughout program implementation. For example, beneficiary registration through biometrics saved significant amounts of money by reducing double dipping. Similarly, *"when we moved from assisting beneficiaries from receiving a standard transfer value, regardless or HH size, to transferring funds*

CRS staff in Maiduguri, NE Nigeria, hold a branded e-voucher. *Photo by Michael Stulman/CRS.*

based on the number of actual individuals, we were able to maximize our assistance and save over $80,000. This money was then used to include new families in the program" (Maggie Holmesheoran, CRS Program Manager).

- **Increased security.** The utilization of e-vouchers has reduced security concerns by eliminating the need for cash to effectuate transactions between beneficiaries and vendors and/or between vendors and the NGO. Furthermore, beneficiary smart cards and vendor payment systems are encrypted to make them impossible to replicate, while the integration of biometric verification to make purchases has drastically reduced the incidents of card theft, protecting beneficiaries' assistance and reducing the potential for misuse, including "double dipping." Finally, security is improved as beneficiaries are not required to gather in large crowds to receive assistance, and program and MEAL teams do not need to be in the field for extensive periods of time to transfer vouchers or monitor activities if there are security concerns. Indeed, voucher disbursement can continue even when CRS staff are temporarily unable to travel to insecure locations, as happened in Gubio in Borno State in August 2017.

- **Fraud mitigation and data protection.** *"Using a (smart) card is more convenient compared to other systems as it prevents others from committing identify theft: I am the only one who can access my assistance"* (Ibrahim Abubakar, Yobe project beneficiary, originally from Marte, Borno LGA). The project team mitigated the risk of fraud by utilizing software and hardware to track expenditures, identify suspicious patterns, and where needed, cancel existing smart cards that had been reported as stolen or lost. All data, stored on a cloud, is nonduplicable once transactions are processed.

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14 The price volatility was compounded by inflation, depreciation of local currency the naira against the US dollar and increased domestic and regional demand pressure. Another contributing factor was increased fuel pump price leading to an increase in transportation costs.

15 As per DFID's *Guidance on Measuring and Maximizing VFM in Social Transfers* (White, Hodges & Greenslade 2013), efficiency relates to how well inputs are converted to the output of interest, which means transfers delivered to beneficiaries. Cost-efficiency analysis spans both economy and efficiency, focusing on the relationship between the costs of a social transfer program and the value of the transfers delivered to beneficiaries.

- **Scalability.** Once the platform has been set up, it can be easily brought to scale, which allows programs to reach more beneficiaries faster. The platform can also be used to deliver a variety of goods (e.g., food, NFIs, specific hygiene items, etc.), to different beneficiaries with funds from different donors. By setting up different "wallets" and projects within the platform, CRS has successfully managed multiple-donor grants and multiple projects without the need to redesign systems and tools.

- **Market support.** Several positive spillover effects of cash-based response on the local economy have been documented. First, the increase in families' disposable income and demand for goods has pushed vendors to diversify their food purchases and resulted in increased availability on local markets, benefitting both beneficiaries and nonbeneficiaries. Ibrahim Boukar, a Monday Market vendor, stated "thanks to the money that I have made, I now stock canned fish and milk." Second, while vendors' revenues have substantially increased, in some cases reaching or surpassing pre-crisis levels, many have also hired additional local labor to support them with their sales, in some cases expanding their shops and storage spaces. Finally, due to project financial compliance requirements, vendors engaged financial services, and established banks accounts to facilitate payment transfers from CRS. While many of these are attributable to cash-based responses, and could thus be applicable to a voucher fair, the utilization of e-vouchers in existing markets better reflects normal market behavior and encourages more structural changes than one-off C&V programs.

Restricted CAT programs can create big demand-driven influence on commodities: In Borno State, the introduction of eggs as part of CRS' nutrient-rich wallet resulted in vendors stocking them for the first time.

ALI'S STORY: TRANSFORMATIVE IMPACT IN THE MARKETPLACE

Ali Mohammed, 43, is a food vendor in the Muna Garage Market, Maiduguri, Borno State. He lives with his nine children and two wives; he is also hosting two displaced families, providing them with food, water and shelter. His younger brother was killed by Boko Haram, while his mother remains trapped in Kala/Balge LGA, where road access has been cut off for three years. Before the crisis, Ali sold commodities for 100,000 NGN per day, including rice, oil, maize, beans and milk.

"Vendors would come from other LGAs to buy milk in bulk, but once families fled their homes trade stopped completely," says Ali. His business and revenues suffered greatly from the conflict as people became less able to purchase food or reach the markets.

Since taking part in CRS' e-voucher project in October

Ali Mohammed recovered and expanded his business dramatically thanks to the e-voucher program. *Photo by Giulia Frontini/CRS.*

2016, Ali has opened a second store in which he sells key household items, has hired four people from the local community and one internally displaced person to help him in the shop, paying them between 500-1,000 NGN daily. Ali has increased his revenues tenfold.

"Before, I made 40,000 NGN per day. On CRS transfer days, I can now make up to 2,500,000 NGN," says Ali. *"What I used to sell in one month I can now sell in a couple of days."*

While his younger brother helped him with the Bluetooth printer, Android device and smartcard early on, Ali is now fully comfortable with the technology.

"I have since learned how to carry out the transactions myself. As the shop owner, it is my responsibility to ensure that the receipts and beneficiaries are correct," says Ali.

"Before (the project) so many people were malnourished, and begging in the streets. Now, they have gone back to leading a more normal life, where when you need food, you can buy it at the market."

- *Improved coordination and information sharing.* The platform and systems allow for data sharing within and between departments, country programs, regions and organizations. For example, at the time of writing, a "Data Sharing" initiative led by CRS, Action Contre la Faim and ZOA was underway to cross-reference biometrics across partners, allowing these organizations to identify and deal with duplicate beneficiaries in El Miskin Extension, an informal IDP settlement in Old Maiduguri in Borno State, and across several LGAs in Yobe State.

B. LIMITATIONS AND CONSTRAINTS

- *Longer start-up time.* In the case of first-time users, setting up the platform and systems, including biometric beneficiary registration, selecting vendors, and rolling out vendor training and beneficiary sensitization, may take time, especially when compared to less ICT4D-intensive projects. Experience has shown that allocating sufficient resources during the start-up phase to set up and test the system and tools greatly reduces the potential for errors during project implementation. If ICT4D equipment is not already available in-country, procurement of these items can take several months.

- *Market functionality.* E-vouchers are appropriate only where markets are functional and vendors can meet an increase in demand. Market-based responses should be selected in consultation with beneficiaries to ensure that they are appropriate for the context and uphold the principle of "Do No Harm."

- *Not a "magic bullet."* Despite the multiple advantages and improvements of the ONEsystem technology when compared to regular paper vouchers or direct distribution, this technology is not a substitute for the development and implementation of systems and procedures required by quality program management. For example, the utilization of biometrics and fingerprint scanners reduces the potential for double registration; however, it cannot fully eliminate inclusion or duplication errors during the beneficiary selection process. As with any project, additional mitigation measures, including data triangulation, cleaning and verification, should be put in place to ensure that HHs are not registered twice. Similarly, well-developed and established vendor payment processing procedures were found to be key to overall program success, particularly when dealing with

Fatima outside her shelter in Muna-Dalti, on the outskirts of Maiduguri town. *Photo by Giulia Frontini/CRS*

"When I fled to Maiduguri, I had to beg for food every day," says Fatima, from Mafa LGA, who recalls having boiled water for dinner on a regular basis.

Fatima, a farmer, fled her home village after Boko Haram killed her neighbors. Since then, she has been living in a makeshift shelter in Muna-Dalti, on the outskirts of Maiduguri town, on her own.

"With the help of a friend I now go buy what I need every month from a vendor near me, including rice, stock cubes and meat when I can find it." Now with the money she received during the first transfer, she can also buy soap and kitchen items: *"I am so happy I can now feed myself, and buy what I need, when I need it."*

a large volume of transfer and payments. In a few instances, discrepancies were found in some of the automatically generated platform reports. While the teams were able to reconcile most errors with the support of the RedRose technical support team, existing paper records were essential in data triangulation and verification.

- *Beneficiary manipulation.* Despite feedback from many project participants on ease of use (*"it's very easy: I learned how to work the [smart] card after the first month,"* said one project participant), for some, such as the elderly and the nonliterate, the utilization of e-vouchers has been problematic, especially when verifying expenditures and

smart card balance. On-site monitoring data highlighted that 1% of interviewed beneficiaries encounter difficulties when using the smart card. In some cases, this has resulted in vendor abuse and exploitation of more vulnerable individuals who have difficulties tracking their expenditures. Although the integration of biometrics, continuous training for both beneficiaries and vendors on beneficiary rights, and quick action against vendors found to exploit beneficiaries or the program have all reduced the risk for fraud, continued sensitization of project participants and vendor monitoring is required to ensure that beneficiaries can access the full assistance, and are not undermined by vendors.

- *Technology limitations.* Utilization of this type of technology is not without risks. The primary challenge centers on access to electricity and internet because the entire system is dependent on a digital platform that only functions on cell phones that must remained charged. Any software bugs or long lapses in electricity may cause program delays. Biometric card readers, in particular, quickly drain batteries, and extreme heat can cause phones to overheat and stop functioning. Additionally, some type of internet connectivity is required to allow for the synchronization of project data onto the CAT platform, which can require downloading very heavy files. Peer-to-peer synchronization is

still dependent on program staff in possession of a phone already synced to the online platform visiting every vendor before and after each disbursement to update or sync with vendor phones. Finally, CRS encountered bugs linked to the utilization of hardware and software—including the biometric OTG cables[16]—and the accuracy of some of the reports published by the platform.

- *Vendor manipulation and utilization.* Vendors are very aware that they have a captive audience (especially when limited numbers of vendors reduce competition), and they may be inclined to increase prices, sell substandard quality items, or charge beneficiaries for items they have not purchased. On-site monitoring data highlights that 6% of beneficiaries were very dissatisfied and 1% were somewhat dissatisfied with commodities prices; per the results stemming from PDM, 47% of interviewed respondents did not feel that vendors were charging a fair market price. In some cases, vendors were found to be selling different items from those being entered in the platform. Rigorous monitoring exercises, such as surveys, spot checks and secret shoppers, during and after cash disbursements and analyzing data collected through real-time price monitoring are key to minimizing potential vendor fraud. Finally, the systems allow for fixing ceiling or standard prices.

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16 In multiple instances, fingerprint scanners were not able to scan the fingerprints of elderly individuals.

IX. LESSONS LEARNED AND RECOMMENDATIONS

The use of e-vouchers proved rich in lessons learned, as summarized in the following table.

STAGES	LESSONS LEARNED	RECOMMENDATIONS & BEST PRACTICES
PROJECT DESIGN		
Platform Set-up	The development of detailed SOPs linked to key platform functions greatly facilitates program implementation, and reduces the risk for errors or confusion.	Develop guidance for program, M&E, finance and administrative management of the cards and the online platform Ensure regular training of CRS and partner staff including finance, management and M&E
	While data stored in the platform is encrypted, agencies should be deliberate in granting access within and outside the project team.	Limit user access based on needs and profiles; consider providing "view only access" to donors and other external entities. Only a few key individuals should have the ability to modify platform content and information. Ensure segregation of duties by separating requesters from approvers within the system.
	Through the platform, the same beneficiary can receive access to multiple assistance packages (food, NFIs, seed and tools, etc.) or "wallets." While this functionality facilitates complementarity, creating too many wallets can also complicate the management of the platform. Likewise, having too few wallets can make it impossible to tie spending to specific projects for certain donor reporting requirements.	Limit the number of wallets created, and balance financial tracking needs with simplicity for users. Elaborate clear SOPs and guidelines for wallet creation and utilization.
	To maximize efficiency and leverage platform functionalities, review internal protocols (financial and others) with service/technology provider.	Involve the service/technology provider from the design of the project through its completion.
	Pilot test the technology, tools and processes first before scaling up.	A progressive scaling up of the technology will ensure that any technical and operational issues are identified and fixed at an early stage. Progressive introduction of e-vouchers, for example, carrying out an initial test trial with a selected number of vendors and beneficiaries, will also prove helpful in winning participant buy-in and trust. Pace scale-up with vendor capacity for crowd management and increasing stock as they gain more capital through program payments.
Hardware Procurement	Not all required hardware is locally available.	Review existing custom regulations for the shipment of hardware into the country and plan start-up accordingly; (ii) preposition hardware in emergency-prone countries or regional offices.

STAGES	LESSONS LEARNED	RECOMMENDATIONS & BEST PRACTICES
PROJECT START-UP		
Adoption of Technology	When provided with training, users learn quickly.	Carry out regular and frequent awareness—raising and sensitization activities—train continuously over the course of the program. Ensure that information is shared through diverse channels and forms; consider user manuals and testing time to preempt visual problems. Training vendors, as well as vendor assistants, who are often younger and more technological savvy, has proven to be an efficient way of transferring skills.
Beneficiary Cards	Smart cards play the dual role of beneficiary ID and means to access assistance; as such, it is important that cards' presentation and layout are thoroughly considered.	Provide branded and unbranded cards for different needs, security and acceptance levels. Ensure that sufficient information is included on beneficiary cards to facilitate beneficiary card distributions, assistance tracking and M&E activities. Embedding key information, such as HH size, gender of head of HHs and families' status, in beneficiary cards' NFC chips can facilitate post-distribution monitoring exercises by reducing the time spent by data collectors capturing demographic information.
PIN Numbers	At the start of the project, beneficiaries were provided with PIN numbers, which in combination with the beneficiary smart card, would allow them to access their assistance. However, due to low literacy rates, vendors, as well as CRS and partner staff, were often the ones to input beneficiaries' PIN, rendering the PIN impractical and providing an opportunity for fraud.	The utilisation of biometrics (fingerprint scanners) allowed beneficiaries to access their assistance without the need of vendors or other parties. Where biometrics are not appropriate, PIN numbers can be replaced by color PINs or images.
Activities Launch	Setting up the platform and systems, including biometric registration, vendor selection and training, and beneficiary sensitization can take time.	Pilots at the start of the project are a helpful way to walk project beneficiaries and vendors through the process, identify and quickly resolve any technical issues stemming from e-vouchers, and increase stakeholders' understanding, confidence and buy-in. Allow sufficient time and staffing during project start-up. While the project is easily replicable and scalable, it is important that MEAL, program staff, managers, finance and operations team are adequately trained during program launch.
PROJECT IMPLEMENTATION		
Achieving Project Results	Beneficiaries' purchasing patterns revealed that beneficiaries were not purchasing sufficient nutritious foods.	Part of the e-voucher was restricted for the purchase of a macronutrient-rich food basket; other similar restrictions can be imposed based on program objectives and needs. If the project's need assessment highlights poorly diversified food basket, consider including a nutrient-rich wallet from the onset of the response. Strong messaging and sensitization should accompany all behavior-change activities to ensure that families can make informed decisions. Carry out regular review and analysis of purchasing data to ensure that beneficiaries are receiving the planned assistance.

STAGES	LESSONS LEARNED	RECOMMENDATIONS & BEST PRACTICES
Achieving Project Results	Vendors were selling substandard food quality items, reducing quantities of goods, increasing prices or charging beneficiaries for commodities that they had not purchased.	With input from the targeted community, ensure that robust and diversified feedback and complaint mechanisms are in place. Ensure formal involvement of community members in the complaint-management process. While not discussed in this case study, the CAT platform allows for the integration with CFM. Ensure that sufficient vendors partake in the project: a higher number of vendors will result in greater competition, lower prices and improved choices for beneficiaries. Ensure strong vendor monitoring throughout the program cycle via on-site and post-activity monitoring, secret shoppers and assigned workers who are tasked with monitoring vendors during periods of high transactions. Carry out regular market price monitoring to ensure that project vendors' prices are in line with local market prices. Assess the market that supports the quantity and quality of goods required by the program; upstream market support may be necessary. For example, to support seed sales in Gubio and Kaga LGAs in Borno State, CRS had to explain the program to the military to ensure vendors could transport their stock.
	Very vulnerable HHs (such as the elderly, persons with disabilities, child-headed HHs) often have greater difficulties in accessing assistance through e-vouchers.	Registering a second HH representative (proxy) can be an effective way of ensuring that families can access the assistance. Workers should be allocated to help and accompany particularly vulnerable HHs
Card Asset Management	Smart cards should be treated and managed as money, because they are money!	Ensure that strong processes are in place for the management, storage and distribution of smart cards. Cards should be stored in a safe space; a detailed ledger should be kept and spot-checks should be regularly carried out to ensure that all cards are accounted for. Only "top up" or disburse assistance to beneficiaries once they have received their smart cards.
Coordination of Transfers	Beneficiaries were found to spend the majority of their voucher in the first one to three days after the assistance had been transferred to their cards.	Through the platform, transfers can be staggered to reduce the number of beneficiaries simultaneously going to the market to access assistance and commodities, and thus implement crowd control efforts. Sufficient vendors should be selected to participate in program activities to meet the increase in demand, serve beneficiaries on day of transfers and more equally distribute wealth among local actors. Continuing education for beneficiaries is necessary to help them understand that they can spend their vouchers over time and at multiple shops. Extremes in spending within the first day or two of disbursement may indicate that the voucher value is too low to sustain beneficiaries from one disbursement to the next.
Vendor Payments	As the number of sales and e-voucher vendors increases, the processing, approvals and documentation requirements for payments exponentially increases.	Elaborate and agree on clear SOP and guidelines for the submission and approval of payments. Keep meticulous paper records and use these to triangulate information stemming from the CAT dashboard Ensure early buy-in of all stakeholders in the payment process, especially as large payment totals bring about higher levels of risk and therefore more scrutiny of internal processes
Coordination	A humanitarian information management system should be put in place as organizations scale up their e-voucher activities.	Develop functionalities allowing the ONEsystem platform to collate data across the platform and countries.

GLOBAL FUND—USING CAT FOR THE DELIVERY OF MOSQUITO NETS

To support long-lasting insecticide-treated bed nets (LLINs) mass campaigns in Nigeria, CRS has employed the CAT platform to help reduce fraud and increase efficiency, transparency and timely payments in several states within Nigeria. For this project, mobile phones, battery packs, fingerprint scanners, ONEsystem software, Mobile Device Management software and support/ticket tracking software were used. The CAT platform was used primarily for:

- Biometric registration of training participants (to date 8,055 unique attendees have been registered in 309 training sessions across two states),

- Registration of HHs (demographic data and GPS coordinates) and distribution of unique Quick Response Code-enabled (QR Code) paper cards,

- Distribution of bed nets tracked through paper cards and unique QR codes,

- Monitoring activities,

- Payment of mass campaign personnel.

The benefits of having real-time data, spatial information and access to rapid analytics have given the campaign team enormous visibility into all program activities, including training, mobilization, distribution and monitoring. Some of the benefits include:

- *Training:* availability of detailed records of training attendance, including location and duration;

- *Financial systems:* integrated platform allowing for electronic bank account verification of all mass campaign personnel for ease of payments to project implementers;

- *Mobilization activities*: access to accurate information on HHs reached by awareness-raising activities and the ability to visually determine if volunteers have completed their activities (i.e., ensuring that all villages were visited);

- *Bed net distributions*: access to information on proximity of HHs to distribution points;

In Nwaorieubi community in Nigeria, CRS staff demonstrate a training for partners on how to use ICT4D to track and monitor the distribution of long-lasting insecticide-treated nets that help prevent malaria. *Photo by Michael Stulman/CRS*

In Nwaorieubi community in Nigeria, a baby lays under a long-lasting insecticide-treated net her mother received from CRS to help prevent malaria in the household. *Photo by Michael Stulman/CRS*

net redemption rates disaggregated by time and location, which enhances increased LLIN redemption rates, i.e., satellite distribution points are better positioned;

- *Monitoring:* Identification of anomalous behavior by household mobilizers and distribution teams which reduces the likelihood of fraud and misappropriation

- *Accountability/justification for payments:* devices record activity of household mobilizers and distribution team during implementation activities, and provide proof of work as evidence to justify hours of work and payment of campaign implementers.

X. CONCLUSION

Experience from the CRS e-voucher project in Northeast Nigeria highlights that, where market-based responses are appropriate, e-vouchers can be a **feasible, suitable** and **scalable modality** for the delivery of food and other commodities, especially in areas of limited infrastructure. and often offer greater value for money. Furthermore, the CAT platform and systems are appropriate in a fast-changing environment, and allow for the **timely scale-up** of activities, change in modality or inclusion of new parameters to better respond to beneficiaries' emergency needs. Most important, in volatile security contexts, e-vouchers allowed program teams to successfully reach beneficiaries, **minimizing security risks** for all key stakeholders. Nonetheless, the e-voucher technology does not and cannot replace program quality standards, tools and processes. Therefore, program teams should ensure that the integration of such solutions is accompanied by regular monitoring, planning and other programming activities.

Finally, and despite the positive results in using closed-loop systems, such as e-vouchers, that are rendered increasingly more effective by the introduction of new technologies, this can only remain a short- to midterm solution. While e-vouchers can provide immediate relief to vulnerable families, greater financial inclusion, whether savings, credit or insurance, will be key in ensuring families long-term resilience. **Humanitarian actors must continue to advocate and work toward better access to financial services, financial education and a more thriving, sustainable trading environment.**

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