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Nigeria: Direct Delivery and Information Capture Activities

March 2012–August 2014

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Abstract

In 2013, the USAID | DELIVER PROJECT implemented a vendor-managed inventory system of distributing health commodities to public sector health facilities in two states in Nigeria. This system, the Direct Delivery and Information Capture system (DDIC) was modelled after the Delivery Team Topping Up system (DTTU) implemented in Zimbabwe by the project since 2003. The DDIC was piloted in Bauchi and Ebonyi states, as a last mile delivery option in a resource limited setting, in terms of reduced human and transport capacity, limited or no stock availability and low data visibility for decision making. In the Nigerian context, the DDIC system was used to distribute family planning, maternal, neonatal and child health (MNCH) and malaria commodities. The collection of logistics data from the service delivery points is concurrent with commodity replenishment and is automated, using the Auto DRV soft-ware. After a year, two additional states, Sokoto and Zamfara implemented the DDIC system. After the pilot phase of the DDIC, a cost evaluation study was conducted in 5 states in Nigeria where the DDIC system was compared to review and re-supply, review and direct delivery and information capture and direct delivery models of last mile distribution. Stock out rates, start up and operating costs, scalability and data quality of each last mile delivery option were compared to the DDIC system. The results of the evaluation were disseminated at a conference in August 2014.

Cover photo: Direct Delivery and Information Capture Conference, Abuja, Nigeria, August 7, 2014. Photo credit: USAID | DELIVER PROJECT

Contents

Acronyms

AS/AQ	artesunate/amodiaquine
AMC	average monthly consumption
BACATMA	Bauchi State Agency for the Control of AIDS, Tuberculosis and Malaria
CMS	Central Medical Store
DDIC	Direct Delivery and Information Capture
DMMA	Drug and Medical Consumables Management Agency
DRF	Drug Revolving Fund
DTTU	Delivery Team Topping Up
FMOH	Federal Ministry of Health
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GHLI-L	General and Health Logistics International, Limited
HCH	Honorable Commissioner for Health
HF	health facility
IC&DD	Information Capture then Direct Delivery
IT	information technology
JSI	John Snow, Inc.
LGA	local government area
LLIN	long-lasting insecticide-treated bed net
MAPS	Malaria Action Plan for States
MNCH	maternal, neonatal, and child health
MOS	months of supply
N	naira (currency in Nigeria)
NMEP	National Malaria Elimination Program
PHC	primary health care
PMI	President's Malaria Initiative
R&DD	Review & Direct Delivery
R&R	Review and Resupply
RRM	Review and Resupply Meetings

SCMS	Supply Chain Management System
SDP	service delivery point
SMOH	State Ministry of Health
SOP	standard operating procedure
UNFPA	United Nations Population Fund
USAID	U.S. Agency for International Development
VMI	vendor-managed inventory

Acknowledgments

Executive Summary

The Direct Delivery and Information Capture (DDIC) model of distributing health commodities—a vendor-managed inventory (VMI) system—enables delivery teams to use an automated inventory control process to replenish health facilities with commodities. A similar VMI model, the Delivery Team Topping Up (DTTU) system is managed by the USAID | DELIVER PROJECT in Zimbabwe; it was the inspiration for the DDIC.

Initially, the DDIC system was part of a cost survey to investigate alternative distribution models that would address supply chain challenges, such as limited human resource capacity, low reporting rates, frequent expiries, and limited product availability.

The USAID | DELIVER PROJECT implemented the DDIC system as a pilot in two states in Nigeria: Ebonyi and Bauchi. This document reports on the DDIC activities from March 2012 to August 2014. In the health facilities selection process, advocacy meetings were held with State Ministry of Health (SMOH) officials and major stakeholders in the DDIC-supported states on selecting health facilities (HFs) for the DDIC roll out. The criteria for selection included accessibility to primary/secondary roads, availability of skilled personnel, availability of storage facilities (security), programs for HFs that implement malaria and reproductive health, and a geographical spread. Based on these criteria, and after a road transportation network analysis, 165 and 213 health facilities were selected for the pilot in Bauchi and Ebonyi states respectively.

Transportation component of the DDIC

As part of the DDIC model, transport was outsourced, based on the evaluation of the technical proposals. One of the three short-listed vendors submitted the most competitive technical and business proposal and they were selected to provide the *rolling warehouses,* as well as the personnel to manage the inventory in transit.

Commodities delivered by the DDIC

Initially, 16 commodities from three health programs—malaria: six; contraceptives: five; and maternal, neonatal, and child health (MNCH): five—were selected for the pilot. This is now expanded to include additional commodities, not all which have been in full supply during any distribution run in any state. Availability of MNCH commodities, in particular, has been erratic. Overall, the total number of commodities available for distribution ranges between 19 and 22.

In developing the capacity to manage the DDIC, two technical assistance providers from Zimbabwe, one provider from the project office in Washington, D.C., and the Nigeria office staff provided and supported the training. Twenty-six participants—the transport vendor: two; the project: five; and state pilot coordinators: two—were included. Of the 26 participants, 20 were certified.

DDIC Delivery Team

The strength of the DDIC is the delivery team. They not only deliver the commodities to the health facilities, but they also manage the inventory on the trucks; determine how much replenishment a health facility will receive; and provide on-the-job mentoring to service providers for commodities management, inventory control practices, and good storage procedures. The quantity of replenishment stock is determined by entering logistics data into the Automated Delivery Receipt Voucher (AutoDRV), which then generates the quantity of stock required to replenish that facility for stock that will last for up to four months. At the end of the delivery run, the AutoDRV is synchronized with the Top-Up software, from which reports can be generated. These reports provide information on the stock status, delivery coverage, stockout, and adjustment summary at the facility-, regional-, and state-levels. Stakeholders receive the reports and use them for decisionmaking.

Implementation of the DDIC

Delivery runs in Ebonyi state began in January 2013, while Bauchi state made its first delivery run in July 2013. Since the DDIC started, stockout rates in the pilot states are lower. For example, in Ebonyi state, stockout rates dropped from above 70 percent (January 2013) to below five percent (March 2014) for all commodities in full supply. In all the supported states, the coverage rate is 100 percent for all HFs and logistics data are readily available for decisionmaking. Although the delivery coverage is 100 percent, replenishment may be limited by seasonal accessibility for some health facilities.

By January 2014, with delivery coverage rates above 95 percent, a significant drop in stockout rates for DDIC commodities, and the availability of real-time data in Ebonyi and Bauchi states; in FY2014, the USAID mission in Nigeria agreed to adopt the DDIC distribution model in two new states: Sokoto and Zamfara.

Evaluating the DDIC

In August 2014, a cost analysis compared three last mile delivery models to the DDIC. These models under study included the Review and Resupply Meetings (RRM), Information Capture and Direct Delivery (IC&DD), and the Review & Direct Delivery (R&DD) options. The costs, data quality, stockout rates, and inventory levels were compared; as well as the considerations for scalability.. Evaluating these last mile delivery options showed that when information capture is based on physical counts, such as in the DDIC, the data accuracy is twice as accurate as when it is based on inventory records. For DDIC and R&R, where the information capture is supported by physical counts, the percentage of inventory records that are within 5 percent of the physical inventory is above 60 percent—averaging 76 percent. However, the accuracy for the IC&DD and R&DD systems, where information capture is based more on inventory records, is below 40 percent—averaging 29 percent. So, when physical counts drive information capture, inventory-level records are at least twice as accurate as when they are not counted. The study also showed that the DDIC had comparatively higher implementation costs, but lower operational costs, when compared to the other delivery models evaluated. Average costs tend to decrease with addition of commodities, confirming economies of scale, even for the DDIC (Watson and McCord 2014).

Background

At the start of 2013, to address supply chain challenges they faced as a resource-limited country, Nigeria launched a pilot vendor-managed inventory (VMI) system of health commodities distribution . These challenges included a reduced human and transport capacity, limited or no stock availability, and low data visibility for decision-making. The USAID | DELIVER PROJECT began implementing this pilot with initial funding from USAID Washington and USAID Nigeria; it was called the Direct Delivery and Information Capture (DDIC). The DDIC was modeled after a successful mechanism for distributing health commodities that the USAID | DELIVER PROJECT has implemented in Zimbabwe since 2003. In Zimbabwe, the Delivery Team Topping Up (DTTU) system is used to deliver health commodities to 1,650 health facilities (HFs) across the country. The DDIC was piloted in two states in Nigeria: Bauchi and Ebonyi.

Accomplishments of the DDIC Activity

DDIC System Design (May 2012)

The DDIC distribution system was designed during a workshop with key Federal and State Ministry of Health officials and other stakeholders, from May 8–12, 2012. A two-level bimonthly integrated distribution system was designed for 16 commodities from three health programs: family planning, malaria, and essential medicines. The required resources, implementation, and research plans were all prepared during the system design workshop.

Participants selected the name for the system—Direct Delivery and Information Capture (DDIC)—after the design workshop.

DDIC Study Tour to Zimbabwe

The project made a DDIC study tour to Zimbabwe in July 2012. A 10-person delegation participated in the study tour, comprising commissioners for health, directors, program officers, and technical experts from the Federal Ministry of Health (FMOH); selected officials from the State Ministries of Health (SMOH) for the pilot states (Bauchi and Ebonyi); USAID Nigeria; and the USAID | DELIVER PROJECT Nigeria field office.

The tour was intended to provide participants with a comprehensive understanding of the structure and operations of the DTTU system, as applied in Zimbabwe. The team learned about the challenges encountered with strategies employed by Zimbabwean counterparts during the development, as well as possible strategies for refinement and subsequent operation of the DTTU system.

The tour was informative and offered practical knowledge of the DTTU operations, which would help participating SMOHs and project staff design, promote; and, otherwise, support the pilot project envisioned for Nigeria. The study tour also gave key Government of Nigeria officials and staff a much greater awareness and understanding of the DTTU model as a possible alternative to the existing public sector health commodity supply chains.

DDIC Software (AutoDRV and Top Up)

To prepare for implementing the pilot in Nigeria, the project team decided to adopt the AutoDRV and Top Up software used for DTTU in Zimbabwe. The source codes for the software were collected from Zimbabwe during the study tour visit. ADS 548 approvals were obtained to adapt the software to the Nigeria context and to acquire hardware components. Two servers (one for each pilot state) were procured; the project's office in Arlington donated laptops for the DDIC activities.

The office information technology (IT) staff routinely addressed all software-related bugs, with occasional support from the project's IT team in Arlington. Since the pilot started, Nigeria office staff have made various enhancements for the software.

In March 2014, the Top Up software was transferred to a cloud-based server where DDIC reports and data are uploaded. To ensure that stakeholders have regular access to DDIC distribution data, a DDIC report portal was also created on the cloud-based server.

DDIC Commodities

Sixteen commodities from three health programs—malaria: six; contraceptives: five; and maternal, neonatal, and child health (MNCH): five—were selected for the pilot (see table 1). It was assumed that full availability of donor-supported commodities (family planning and malaria) would be ensured.

The project participated in advocacy-related activities with the President's Malaria Initiative (PMI); National Malaria Elimination Program (NMEP), which is the principle recipient for the Global Fund's (GFATM) malaria program; and the United Nations Population Fund (UNFPA) for procuring commodities for the DDIC pilot states. The USAID | DELIVER PROJECT prepared forecasts for malaria commodities for Ebonyi and Bauchi states; and PMI agreed to support the procurement of malaria commodities for the DDIC pilot roll out. PMI procured malaria commodities for 200 and 165 HFs in Ebonyi and Bauchi states, respectively. Table 1 lists all 16 commodities selected for the DDIC pilot.

Table 1. Sixteen DDIC-Supported Commodities as Agreed at the System Design in May 2012

Contraceptives	MNCH	Malaria
Microgynon	Oxytocin	A/L 1 x 6
Microlut	ORS	A/L 1 x 12
Noristerat	Zinc	A/L 1 x 18
Depo-Provera	Misoprostol tab	A/L 1 x 24
Male condoms	Magnesium sulfate	Rapid diagnostic tests
		Sulfadoxine-pyrimethamine

In Ebonyi state, UNFPA, through the DDIC model, provided misoprostol tablets and magnesium sulphate injections for distribution to HFs. The GFATM provided malaria commodities in Ebonyi state, while the World Bank provided malaria commodities through the malaria booster project in Bauchi. At the stakeholder meetings, which were held at both the state- and federal-levels, it was

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agreed that harmonization of all donors' commodities should take place at the state Central Medical Store (CMS) for distribution to the DDIC-supported facilities.

Because of the preliminary success of DDIC, the decision was made that all malaria commodities—except long-lasting insecticide-treated bed nets (LLINs) and all family planning commodities—should be included as DDIC-supported commodities. During the same period, DDIC was also rolled out in Bauchi state, with 24 DDIC-supported commodities.

It should be noted that not all 24 commodities have been in full supply during any distribution run, in any state. Availability of MNCH commodities has been very erratic. Overall, the total number of commodities available for distribution varies between 19 and 22.

Bauchi SMOH, through the Bauchi State Agency for the Control of AIDS, Tuberculosis and Malaria (BACATMA), decided not to distribute artesunate/amodiaquine (AS/AQ) in the state because of the perceived side effects attributed to the medicine. The refusal to distribute AS/AQ persisted even after a sensitization activity informing the state that AS/AQ supplied by PMI had been reformulated to decrease the side effects attributed to the amodiaquine component. But, AS/AQ has not been distributed through DDIC in Bauchi state.

DDIC Commodities Starter Packs for First Distribution Runs in Supported States

Prior to DDIC standard operating procedures (SOP) training of team leaders, consumption data was collected for the available commodities from programs supporting the various commodities in the two states. For malaria commodities, consumption data were used from the Malaria Action Program for States (MAPS)–supported HFs in the state. For family planning commodities, consumption data from the state family planning program were used. In states where the project has supported the family planning program, logistics data from the most recent review and resupply (R&R) meeting were loaded into the AutoDRV for the first DDIC distribution runs. This enabled staff to use AutoDRV historical data for the supported HFs, and it supported the data transition from the R&R distribution mechanism to the DDIC. For MNCH commodities, forecasted quantities were used to determine average monthly consumption (AMC), which were rounded up to four months of stock (MOS). This was done for all commodities to determine the starter pack quantities—which were for estimated consumption for four months (see table 2).

Another important factor was the quantity of each commodity available at the state CMS, prior to the commencement of the delivery run, to determine if available commodities were sufficient for the distribution run. Stock count was completed for each commodity at the state CMS prior to beginning each distribution run.

Table 2. Starter Pack Table for First Distribution Run in Ebonyi State

	Commodities	Units	Quantities for each HF	Packs	Total No. (units) for 63 HFs during first delivery run	Available stock at state level
Pilot DDIC Commodities Starter Packs for Each Health Facility in Ebonyi						
A	**Malaria Commodities (using maximum consumption data from Ebonyi PHCs)**					
1	Artemether/ lumefantrine 1 x 6	Blister of 6 tabs	300	10	18,900	88,140
2	Artemether/ lumefantrine 2 x 6	Blister of 12 tabs	180	6	11,340	142,770
3	Artemether/ lumefantrine 3 x 6	Blister of 18 tabs	90	3	5,670	72,660
4	Artemether/ lumefantrine 4 x 6	Blister of 24 tabs	510	17	32,130	147,960
6	Malaria rapid diagnostic test	Test	575	23	36,225	259,270
B	**Contraceptives (using adjusted consumption data from Ebonyi state)**					
1	Microgynon	Cycle	15	5	945	1,281
2	Microlut	Cycle	12	4	756	1,254
3	Noristerat	Amp	25	0	1,575	2,536
4	Depo-Provera	Vial	15	0	945	1,111
5	Male condoms	Piece	288	2	18,144	30,923
C	**MNCH Commodities (using forecast figures from Ebonyi state)**					
1	Misoprostol tablets	Tablet	150	50	9,450	10,377
2	Magnesium sulfate injection	vial	20	2	1260	2265

DDIC Transport Management

A DDIC transport services request for proposal (RFP No 12 - 093) was advertised on September 5, 2012, on the USAID | DELIVER PROJECT website. Eleven vendors submitted both technical and business proposals for evaluation. All technical proposals were evaluated and three were short-listed for business evaluation. The Nigeria field office conducted due diligence site visits to review the fleet and management capacity of the offerors to successfully complete the operational strategies

provided in their proposals. Field staff determined that General and Health Logistics International, Limited (GHLI-L) submitted the most competitive technical and business proposals; they were subcontracted to provide transportation service for the DDIC pilot in Bauchi and Ebonyi states.

Selection of DDIC-Supported Health Facilities

Advocacy meetings were held with SMOH officials and major stakeholders in the DDIC-supported states on the selection of HFs for the DDIC roll out. The criteria for selection included the following;

- accessibility to primary/secondary roads

- availability of skilled personnel

- storage facilities (security)

- HFs implementing malaria and reproductive health programs

- geographical spread.

Based on this criteria, the 15 GFATM-supported HFs in each local government area (LGA) were included in Ebonyi state. Earlier, because the project decided to roll out the pilot to 200 HFs in the state, additional health facilities were selected from LGAs with a larger number of HFs: Ikwo, Ezza South, and Ivo. An increase in PMI/MAPS–supported HFs, and the inclusion of six government-supported rural HFs, increased the total number of HFs to the current 213.

In Bauchi state, the project decided to roll out the DDIC pilot in 250 HFs across the 20 LGAs in the state. A road network analysis informed the HF selection criteria to only include facilities located within 5 kilometers of primary and secondary roads. Based on these criteria, the number of HFs was decreased from 250 to 165, which was accepted for the pilot.

DDIC SOP/AutoDRV training

The pilot DDIC SOP/AutoDRV training, held during January 8–12, 2013, was facilitated by a team of two technical assistance providers from Zimbabwe; one provider from the project office in Arlington, Virginia; and one Nigeria office staff.

An interactive, five-day training on the DDIC SOPs included activities and scenarios on using laptops loaded with AutoDRV software for the DDIC distribution system. The key content areas covered in the course included—

- quick overview of DDIC system—video clip of DTTU from Zimbabwe

- introduction to computers and caring for laptops

- purpose of a DDIC SOP manual

- introduction to DDIC and commodities

- role and responsibilities in the DDIC system

- overview of LMIS forms and how to complete them (letters of request, stock reconciliation form, truck stock card, paper-based DRV)

- introduction to AutoDRV

- how to complete the AutoDRV facility worksheet

- how to complete the post-delivery report and summary delivery report

- how to manage emergency orders in the DDIC system

- how to supervise storage practices and handling expired/damaged stock

- strategy for first delivery run

- DDIC transport guidelines.

Participants were highly motivated to learn the DDIC system. Throughout the course, facilitators gave participants practical exercises and many examples to help them understand the DDIC system, including software functionality. The final assessment helped the participants understand all the activities required in preparing and executing the DDIC delivery runs, including completing reporting in the AutoDRV system.

> **Box 1. Adult Learning Theory Approach**
> The training followed the Adult Learning Theory approach, which encourages active participation and engagement. Training methods like question and answer, small and large group discussion, exercises (individual and pair), lecturettes, and brainstorming were used throughout the training. These helped participants to appreciate the pilot DDIC system in Nigeria. A training evaluation questionnaire was distributed at the conclusion of the course. The training was highly rated and appreciated by the participants.

Course participants

Twenty-six participants attended: nine from Ebonyi, eight from Bauchi, two from General and Health Logistics International, two pilot coordinators from the state, and five from the project. Of the 26 participants, 20 (77 percent) received certificates of competency; six participants (23 percent) received certificates of completion. To receive a certificate of competency; participants had to score 75 percent or above on the final course assessment; and they were also tested on computer skills and leading a revision exercise in a group. All certified participants were part of the pilot in Ebonyi and Bauchi states.

Simulated Distribution Runs for Team Leaders

Team leaders did a simulated distribution run before the actual distribution runs in each state. It tested DDIC operations at the CMS and HFs and gave the team leaders firsthand experience at the facilities. To ensure effective deployment of the AutoDRV software, an assessment of team leaders during the simulated distribution runs identified components of the distribution activities that required further mentoring.

DDIC Sensitization/Orientation Activities

Sensitization and orientation meetings were held for staff from all the supported HFs and LGA program officials in all the LGAs that received pilot first-time DDIC deliveries. The meeting was used to introduce DDIC and its operations to the HFs and LGA personnel. They discussed relevant issues that are likely to occur during the delivery runs, including roles and responsibility of all key players in the pilot DDIC activities.

Roll Out of DDIC Distribution Runs in Pilot States

DDIC Roll Out Activities in Ebonyi State

The first delivery runs in Ebonyi state began in January 2013. Since then, 10 delivery runs have been successfully completed in the state.

Table 3. Roll Out of DDIC Distributions in Ebonyi State

Ebonyi State	Period	Duration	Delivery Coverage (HFs)	Number of Commodities Delivered
2013	1	Jan. 28–Feb. 14	61	12
	2	March 11–April 5	107	12
	3	May 6–-June 14	198	12
	4	July 8–-Aug. 16	204	19
	5	Sept. 9–Oct. 18	204	19
	6	Nov. 4–Dec. 13	202	20
2014	7	Jan. 13–Feb. 21	213	21
	8	March 10–April 22	207	21
	9	May 5–-June 13	212	21
	10	July 7–Aug. 21	209	21

Because of the frequent staff attrition and inter-facility transfers, the delivery team frequently found that the service providers from some service delivery points (SDPs) were not available. This resulted in fluctuating delivery coverage rates after full scale-up to 213 health facilities in January 2014.

DDIC Achievements in Ebonyi State

Release of naira (N) 80 million for procuring MNCH commodities to distribute in Ebonyi state

The Ebonyi State Honorable Commissioner for Health (HCH) is committed to procuring MNCH commodities for distribution to HFs in the state using the DDIC distribution model. The state released N80 million to procure the MNCH commodities; they were available for distribution through the DDIC during the 2014 MNCH week celebrations in May 2014.

Governor of Ebonyi state, Chief Martin Elechi, flag off of DDIC activities

In May 2014, DDIC flag off activities took place in Iboko, Izzi local government headquarters, as part of the MNCH week activities. Participants at the flag off ceremony included the state governor and his wife; deputy governor and his wife; commissioners; state house of assembly members; LGAs; development centers chairmen; traditional rulers; partners; and health workers, among others.

Various dignitaries with the HCH made speeches; they expressed their appreciation to the USAID | DELIVER PROJECT for selecting Ebonyi state as a pilot state to distribute essential medicines to 213 HFs, across the 13 state LGAs.

Samples of MNCH commodities at the flag off ceremony in Ebonyi state

The DDIC national coordinator, representing the project, spoke on behalf of the project and development partners. The coordinator expressed his appreciation to the state government for supporting DDIC with procuring MNCH commodities for distribution through the DDIC model. DDIC, he stated, has reduced the stockout rates of malaria and family planning commodities to below 3 percent in supported HFs. With the SMOH procuring MNCH commodities, DDIC would ensure their distributions and provide data that could inform future procurements.

Gov. Martin Elechi addressing the crowd

Improving commodities and data availability in Ebonyi state

After 10 bimonthly distribution cycles in Ebonyi state, commodity availability has dramatically improved. Stockout rates have been reduced from above 70 percent (January 2013) to below 5 percent (March 2014) for all commodities in full supply (see figure 1 and figure 2). Coverage rate is 100 percent for all HFs and logistics data are readily available for decisionmaking.

Figure 1. Stockout Rates for Malaria Commodities at Health Facility Levels in Ebonyi State

	1	2	3	4	5	6	7	8	9	10
AL 1 x 6 tabs	77.05	1.64	0.93	1.52	0.49	0.98	0.98	3.79	4.69	12.21
AL 2 x 6 tabs	78.69	1.64	2.8	3.03	2.46	0.98	2.45	3.79	5.16	11.74
AL 3 x 6 tabs	78.69	1.64	2.8	5.56	3.94	3.43	3.92	11.37	10.33	11.27
AL 4 x 6 tabs	77.05	1.64	1.87	1.52	1.48	0.98	2.94	5.69	6.57	12.21
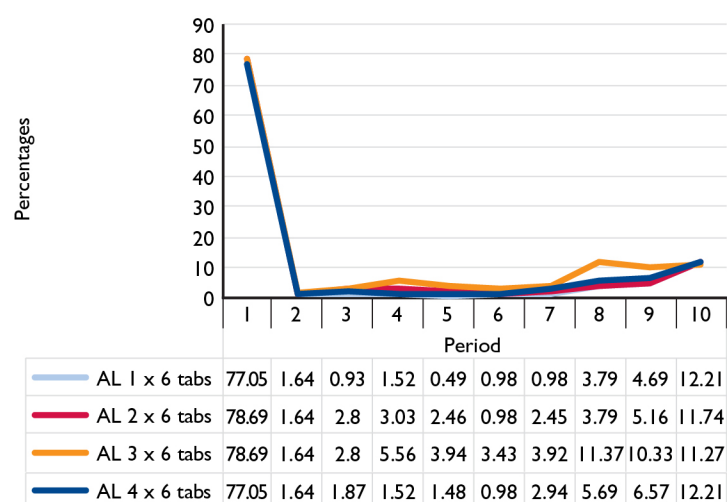
Figure 2. Stockout Rates for Family Planning Commodities at Health Facility Levels in Ebonyi State

	1	2	3	4	5	6	7	8	9	10
Depo Provera	55.74	6.56	3.74	2.53	3.45	2.94	2.45	0.95	4.64	3.55
Microlut	72.13	4.92	4.67	3.03	5.42	4.41	3.43	0.95	1.55	4.59
Male condom	77.05	8.2	10.28	10.1	5.91	6.37	5.39	3.32	9.27	6.83
Microgynon	68.85	3.28	3.74	2.02	1.48	1.96	2.45	0.95	3.08	3.03
Noristerat	70.49	4.92	2.8	3.03	0.49	2.45	1.47	0.47	2.03	2.51
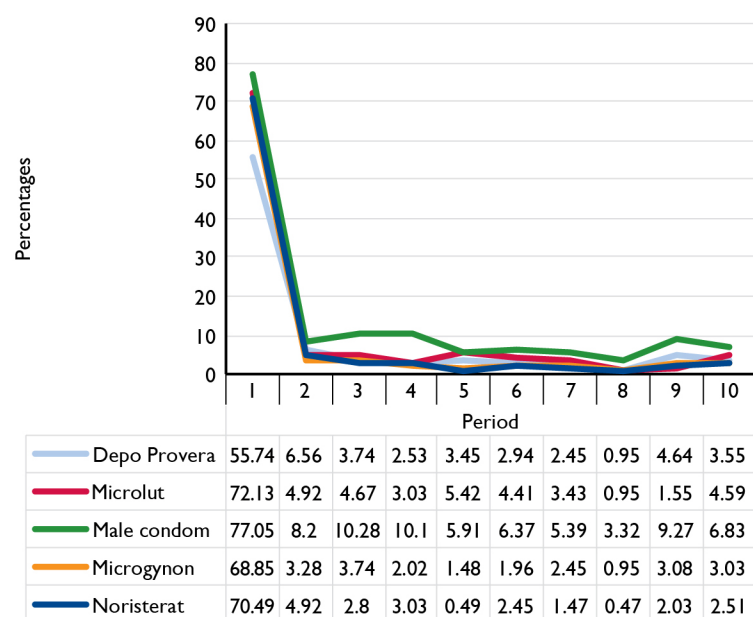
DDIC Roll Out Activities in Bauchi State

DDIC roll out in Bauchi state started in July 2013. Since then, seven delivery runs have been successfully completed.

Table 4. DDIC Roll Out in Bauchi State

Bauchi State	Period	Duration	Delivery Coverage	No. of Commodities Delivered
2013	1	July9–23	79	12
	2	Sept. 10–Oct. 4	116	12
	3	Nov. 4–Dec. 5	165	12
2014	4	Jan. 13–Feb. 17	162	19
	5	March 10–April 11	162	19
	6	May 5–June 4	159	20
	7	July 7–Aug. 10	163	21

The USAID | DELIVER PROJECT conducted a refresher training for team leaders and other operators of the system who were initially trained in January 2013. The project also completed a state-level sensitization for HF staff and key stakeholders at the SMOH, State Ministry of Local Government & Chieftaincy Affairs, state transport company, Yankari Express, and local governments with the goal of informing all relevant and concerned stakeholders about their roles and responsibilities, and to brief them on the schedule of upcoming pilot DDIC activities in the state.

DDIC Achievements in Bauchi State

Governor of Bauchi State, Mal. Isa Yuguda, flag off of DDIC activities

Pilot DDIC activities were flagged off by the Executive Governor of Bauchi State, Mal. Isa Yuguda on Monday, July 1, 2013. Attending were commissioners, permanent secretaries, directors, and executive chairmen of various agencies; and other dignitaries from Bauchi state. The HCH, Dr. Sani Abubakar Malami, the chief host of the ceremony, expressed his appreciation to the project, on behalf of the SMOH, for supporting the state health programs with an innovative distribution mechanism for health commodities.

Photo Credit: USAID | DELIVER PROJECT 2009

Gov. Isa Yuguda and Ministry of Health staff inspecting the delivery vehicles and commodities

The governor was grateful for all the support Bauchi state received from all USAID-supported projects in the state. He pledged the support of his government to the DDIC delivery model and promised that the relevant agencies will procure MNCH commodities for distribution to HFs through the DDIC model. Following on this commitment, 50,000 doses of misoprostol tablets—out

of an expected 125,000 doses—were procured by the state government for distribution to HFs through the DDIC model.

After flagging off the DDIC pilot activities, he inspected the DDIC delivery trucks and the warehouse of the Bauchi State's Drug and Medical Consumables Management Agency (DMMA), where the DDIC commodities, particularly the PMI-procured malaria commodities, were stored. The USAID | DELIVER PROJECT Nigeria deputy chief of party and the DDIC national coordinator represented the project.

Gov. Isa Yuguda and John Durgavich at the launching of the DDIC pilot

Renovation of Bauchi CMS warehouse

To effectively roll out the pilot DDIC in Bauchi state, commodities were stored at the state level and conveyed from there to the HFs. The Bauchi SMOH had twin warehouse structures located in the state library complex. The DMMA renovated one of the structures for storing the commodities managed under the Bauchi State Drug Revolving Fund (DRF). During the DDIC system design, storage space in this renovated facility was allocated for DDIC commodities. Due to insufficient space in the DMMA warehouse, the option of renovating the next warehouse building was proposed at the DDIC system design. The project, therefore, with funds from Task Order 4 field office technical support services, renovated this warehouse structure; it will be used to store DDIC commodities.

Improving commodities and data availability in Bauchi state

After five bimonthly distribution cycles in Bauchi state, commodity availability has drastically improved and stockout rates are significantly reduced. Coverage rate is 100 percent for all HFs and essential logistics data are readily available for decisionmaking.

Figures 3 and 4 show stockout rates for malaria and family planning commodities at the health facilities in Bauchi state.

Figure 3. Stockout Rates at the SDP-Level for Malaria Commodities in Bauchi State

	1	2	3	4	5	6	7
AL 1 x 6 tabs	40	28	33	8	3	1.84	10.43
AL 2 x 6 tabs	53	47	45	17	12	20.25	43.56
AL 3 x 6 tabs	61	39	53	42	53	32.52	63.19
AL 4 x 6 tabs	49	29	49	39	59	40.49	74.23
RDTs	30	27	22	10	0	0.61	4.91
SP	47	15	12	6	0	1.84	2.45
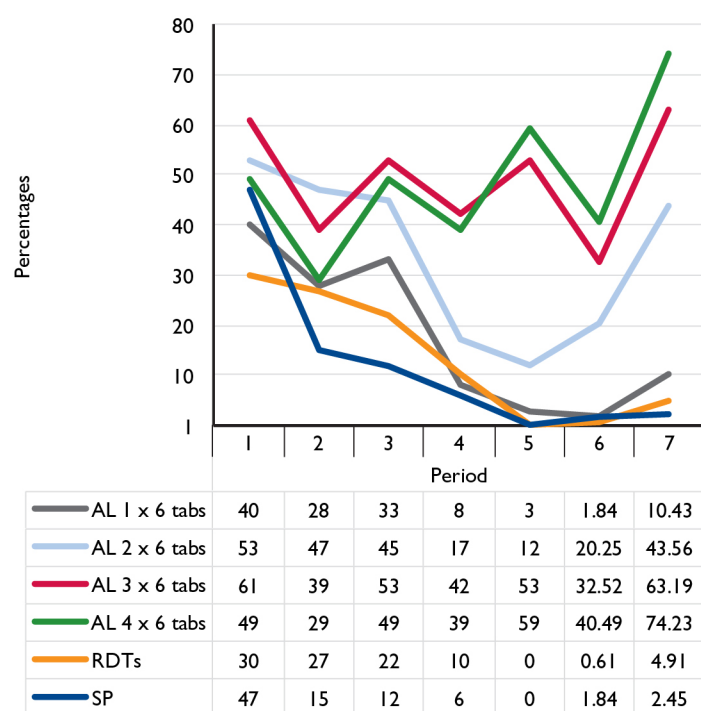
Figure 4. Stockout Rates at the SDP-Level for Family Planning Commodities in Bauchi State

	1	2	3	4	5	6	7
• • • • Depo Provera	6	6	6	2	0	1.23	2.45
• • • • Microlut	10	9	6	4	1	1.84	1.84
• • • • Female condom	25	18	9	7	4	4.29	4.29
▬▬ Implanon	10	5	12	7	2	5	1.43
▬▬ IUCD	19	5	8	5	1	6.52	0.72
▬▬ Jadelle	12	8	6	6	1	5.76	0.72
▬▬ Male condom	18	25	11	9	1	4.91	3.68
▬▬ Microgynon	16	6	10	7	1	1.23	4.29
▬▬ Noristerat	8	1	4	2	1	0.61	0.61
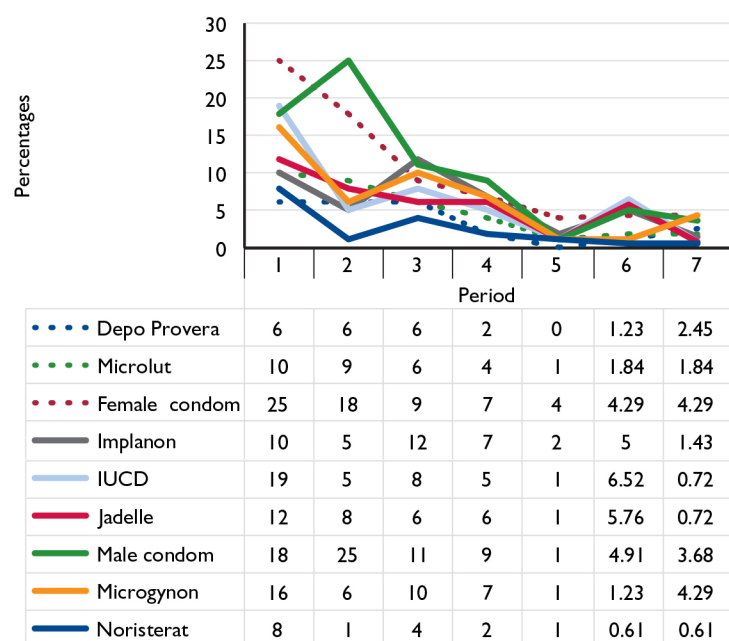
The World Bank Booster project supports the malaria program in Bauchi state. PMI support began when the pilot started. Initial quantification for PMI-supported states did not include Bauchi state; therefore, malaria commodities for the pilot were drawn for other states. Coupled with limited stock at the central level, this led to the rationing of malaria commodities, which meant comparatively high stockout rates for AL-1, AL-2, AL-3, and AL-4.

DDIC Roll Out in FY2014 to Two Project–Supported States

With delivery coverage rates above 95 percent, significant reductions in stockout rates for DDIC commodities, and the availability of real-time data shown in Ebonyi and Bauchi states; the USAID mission in Nigeria, in FY2014, agreed to adopt the DDIC distribution model in two new states: Sokoto and Zamfara. Engagement/sensitization meetings were held at the state level; the state agreed to collaborate with the project on DDIC activities. Key stakeholders, including the SMOH, Ministry of Local Government and Chieftancy Affairs (MOLG&CA), and implementing partners, selected the commodities and HFs. In January 2014, to prepare for the roll out of the DDIC, team leaders and other DDIC personnel were selected and trained. Orientation activities were carried out for supported HFs and LGA personnel prior to the roll out of the model across the states.

DDIC Roll Out in Sokoto State

DDIC roll out in Sokoto state started in February 2014. Since then, four delivery runs have been successfully completed (see table 5).

Table 5. DDIC Roll Out in Sokoto State

Sokoto State	Period	Duration	Delivery Coverage	No. of Commodities Delivered
2014	1	Feb. 10–March 8	344	12
	2	March 31–May 7	344	12
	3	May 30–June 25	344	12
	4	July 8–Aug. 18	344	19

DDIC Roll Out in Zamfara State

DDIC roll out in Zamfara state started in February 2014. Since then, four delivery runs have been successfully completed (see table 6).

Table 6. DDIC Roll Out in Zamfara State

Zamfara State	Period	Duration	Delivery Coverage	No. of Commodities Delivered
2014	1	Feb. 10–March 4	210	12
	2	March 17–April 17	219	21
	3	May 5–June 5	211	12
	4	July 7–Aug. 12	211	19

Last Mile Distribution Systems Evaluation in Nigeria

A cost-effectiveness study was conducted in five states in Nigeria: Bauchi, Ebonyi, Sokoto, Cross River, and Benue. Four last mile delivery systems were evaluated—the R&R system; the DDIC; the cluster review meeting or Review & Direct Delivery (R&DD); and the LGA review meetings, referred to as the Information Capture then Direct Delivery (IC&DD).

The goal of the study was to—

1. Cost each of the four last mile distribution systems and investigate cost variations between the systems.

2. Determine the stockout rates and inventory levels achieved by the various last mile system instances.

3. Determine the data quality and lead time for collection of data achieved by the various last mile system instances.

4. Consider the scalability of the last mile distribution systems given the considerations for adding commodities and facilities to the systems.

Key Findings

Inventory management

For inventory performance, all systems were similarly functional with single-digit stockout rates and good general inventory availability, given the supply.

Costing

A costing exercise using standard costing methodology revealed that, at their respective scales, all last mile systems use significant levels of management, facility labor, and logistics resources; and they have significant funding from both the Government of Nigeria and donors. The costs, whether normalized by cubic meters delivered or dollars' worth of commodity delivered, showed clear effects of scale with the systems, with larger volumes distributed tending to have lower costs. Normalizing costs by assuming a common scale—number of facilities and volume distributed for all systems—showed the DDIC and IC&DD with the lowest costs, followed by the R&DD and the R&R.

Scalability

The cost ranking from normalizing costs to account for differences in scale seemed to play out in simulations of increasing scale, whether by adding commodities or facilities to last mile distribution systems. DDIC and IC&DD have similar costs, with a slight preference for DDIC for lower

number of commodities; followed by R&DD and then R&R. Average costs tend to decrease with the addition of commodities, confirming economies of scale, even for the DDIC.

Data quality

For DDIC and R&R, where the information capture is supported by physical counts, the percentage of inventory records within 5 percent of the physical inventory is above 60 percent, with an average of 76 percent. While the accuracy for the IC&DD and R&DD systems, where information capture is based more on inventory records, is below 40 percent, averaging 29 percent. Therefore, when physical counts drive information capture, inventory level records are at least twice as accurate as when they are not physically counted (Watson and McCord 2014).

Last Mile Distribution Systems Evaluation in Nigeria Dissemination Conference

The last mile distribution systems evaluation dissemination conference took place on August 7, 2014. In attendance were representatives of the following organizations:

1. USAID Nigeria
    a. Acting Deputy Mission Director
    b. Two activity managers for the USAID | DELIVER PROJECT and SCMS.

2. Federal Ministry of Health
    a. Directors
    b. National Program Managers/Coordinators
    c. Program staff

3. State Ministries of Health
    a. Commissioners for Health (Ebonyi, Benue and Nasarawa)
    b. Representatives of States Commissioners for Health
    c. Directors of Pharmaceutical Services

4. Donors and implementing partners

The keynote address was given by the Acting USAID Mission Director, Kathy Body, with goodwill messages from the United Nations Population Fund (UNFPA), FMOH, MAPS, and Targeted States High Impact Project (T/SHIP).

An overview of DDIC processes and other last mile distribution models were presented. This was followed by the dissemination of the last mile distribution models evaluation. Questions and answers; and panel discussions on lessons learned, were followed by a presentation on engaging third-party logistics providers from the supply chain operations department at the USAID | DELIVER PROJECT office. The conference was a success in terms of attendance, dissemination of evaluation findings, and participation and engagement of participants.

Conclusion

The DDIC mechanism for distributing health commodities was successfully implemented in Nigeria. During one year, a significant reduction in stockout rates for commodities in full supply was recorded.

Results of the cost evaluation study showed that while separate and simultaneous information capture and delivery can be the foundation for cost-efficient last mile distribution systems, the DDIC benefited from the automatic cost savings with simultaneous information capture and delivery (Watson and McCord 2014).

When operating at the same scale, the operating costs for facility labor was 10 times less for the DDIC system compared to the review and resupply models for last mile distributions.

Finally, when physical counts are used for information capture, it usually results in more accurate inventory records (Watson and McCord 2014).

References

Watson, Noel, and Joseph McCord. 2014. *Evaluating Last Mile Distribution Systems in Nigeria.* Arlington, Va.: USAID | DELIVER PROJECT, Task Order 4.

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