

Using mobile technology to improve community health supply chains in Malawi

cSTOCK

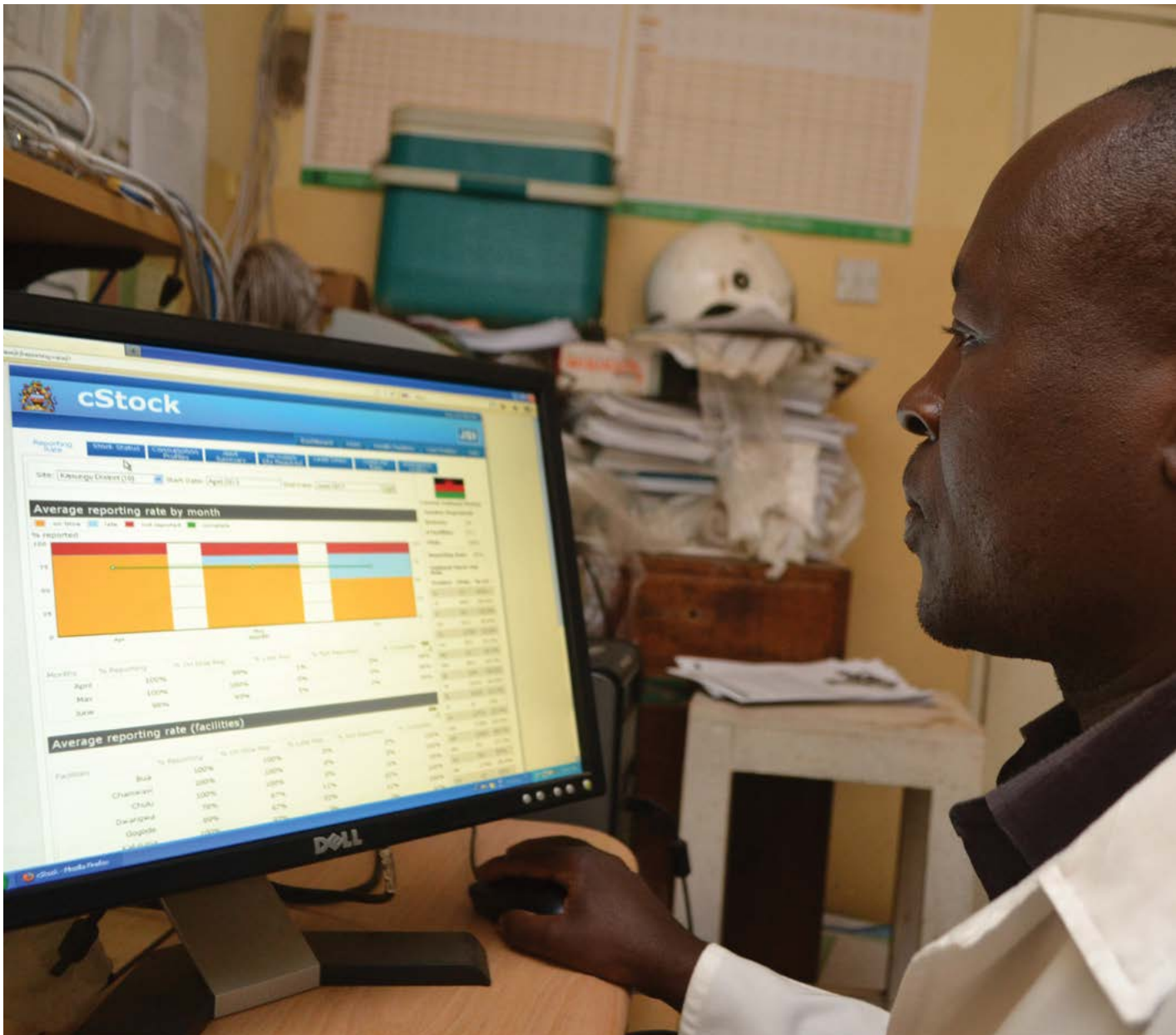


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The combination of mobile technology, user-friendly dashboards, and quality-improvement teams have improved the reliability of supplies of life-saving commodities in community-based health programs.

In 2015, nearly 6 million children under the age of five died from treatable causes such as pneumonia, diarrhea, and malaria.¹ Integrated Community Case Management (iCCM) is one strategy for reducing childhood mortality by having community health workers (CHWs) trained to treat children under five close to home. However, investments in training CHWs to treat these children are often undermined by weak supply chains which are unable to consistently deliver medicines to CHWs.

The Supply Chains for Community Case Management Project's (S4CCM) goal was to find proven, simple, and affordable solutions for the supply chain challenges faced by CHWs in Malawi, Rwanda, and Ethiopia. iCCM was first introduced in Malawi in 2008. Two years later, John Snow International, Inc. (JSI)'s SC4CCM project conducted a baseline assessment that revealed poor medicine availability, with only 23% of CHWs having in stock the four key lifesaving medicines needed to treat all three targeted childhood illnesses on the day of the survey. A lack of visibility into stock levels at the community level and weak coordination and management practices used to respond to the needs of the CHWs were identified as the primary causes of the weak supply chain. However, the survey results also identified an opportunity, with 94% of CHWs owning simple mobile phones and 85% having network coverage at least some of the time.²

About cStock

In collaboration with Malawi's Ministry of Health (MOH), JSI designed the Enhanced Management (EM) approach. EM was developed to promote superior team performance practices and the use of data to inform decisions and improve supply chain performance to increase the availability of medicines for community health programs. The following three key components ensure the program's success:

1. **cStock:** The overall goal of cStock is to improve reporting and visibility of community health logistics data. It is a RapidSMS-based reporting and resupply system that facilitates timely data transmission and communication between the CHWs and the facility that supplies them with medicines. Using a streamlined, demand-based reporting and resupply process, stock data reported by the CHW triggers the re-order process, whereby cStock automatically calculates resupply quantities and transmits a request via SMS to supervisors at health facilities. The facilities then send feedback to the CHW when the order is ready or if they are out of stock. Urgent matters, such as stock-outs or low stock levels, are communicated through SMS alerts.
2. **A user-friendly dashboard:** The web-based dashboard provides visibility of real-time CHW logistics data for district- and central-level managers. The system transforms two reported data elements into more than 10 supply chain indicators that are displayed on the dashboard as easy-to-use, relevant graphs and reports that facilitate rapid decision-making. These data can be used for coordination, planning, and identification of stock issues.
3. **District product availability teams (DPATs):** They complement cStock, building strong leadership and creating teams of CHWs that work together to support the goals of the intervention. They are comprised of district management, health center (HC) staff, and CHWs. DPATs have a common goal of improving

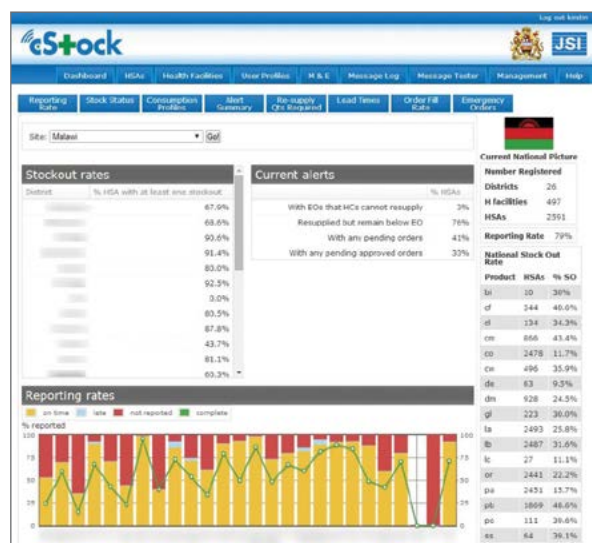
availability of essential medicines, and are designed to regularly use data provided by cStock to monitor community supply chain performance and address supply chain challenges. HC staff meet CHWs every month when they come to HCs for resupply; districts meet with CHW supervisors every quarter.

Program Design Process

Formative research, including quantitative and qualitative assessments, was conducted from May to June 2010 in 10 districts across Malawi's three geographical regions. Based on the results of the assessment, the project explored and consulted stakeholders on many different intervention options, focusing on transportation, motivation, and technology, and considered issues of affordability, scalability, and sustainability as criteria for selection. Two intervention packages were then designed and piloted over 18 months (see evaluation and results).

The design and development of cStock is based on a user-centered and iterative approach that combines the knowledge of supply chain experts with user experiences. The core principles of the design are to keep it simple; design with the end-user in mind; focus on feasibility, practicability, relevance, and usability; build ownership from all stakeholders throughout the process; and plan for scale and sustainability from the outset. The system was also designed to align and integrate into the current system by including workflows that streamlined existing procedures and practices, reducing workloads rather than increasing them.

Figure 1.
Sample cStock dashboard



All cStock users received a two-day training at the launch of the pilot. In addition, quarterly monitoring and implementation support were provided throughout the pilot period and feedback received was used to refine cStock and other accompanying tools and training.

In designing the system and workflows, consideration was given to ensure that key stakeholders have access to the data they need, and in a format that is easily accessed and interpreted. User inputs during the initial design phase were limited mainly to defining the workflows in terms of the recipients, content, timing, and format of the messages. The initial design of the dashboard was rudimentary, with limited time invested, and included only the basic supply chain metrics identified by the supply chain experts. The decision to begin with a simple dashboard was based on users' lack of experience with receiving, visualizing, and acting upon real-time supply chain data. After the users gained experience in using online reports, and a better understanding of how they could use logistics data to measure and monitor supply chain performance, the project engaged the users for input on the dashboard design.

Monitoring data were also used to design some targeted intervention-support activities, including sending group SMS messages to users on common data entry errors and conducting extra training sessions for HC staff on how to run effective meetings. Throughout the pilot, monitoring data were also shared with stakeholders, including MOH central staff and implementing partners, to get their input and ideas on addressing challenges.

Growth in Scale

The scale-up approach was defined by four primary strategies over two years (2013–2014). Strategies included gaining MOH endorsement, maintaining close engagement and coordination with partners, creating a dedicated cStock task-force, and developing a national product availability team. In this way, the necessary political will, buy-in, continuous engagement, and ownership was in place to maximize the potential for sustainability over time.

1. **MOH endorsement:** The MOH initially endorsed scale-up of cStock (but not DPATs) before the project had completed a full evaluation. The endorsement was triggered by enthusiasm for the unprecedented levels of access to community logistics data, positive



feedback from users, and high adoption of the system. After conclusion of the pilot, the evaluation data clearly showed that although supply chain performance improved with the implementation of cStock, performance was significantly better with the EM package that combined both cStock and the DPATs. Based on these findings, the MOH endorsed the full EM package.

2. **Continued engagement and coordination with partners:** A vital part of planning for scale entailed the project's ongoing engagement and coordination with local partners, led by the MOH. This served to broaden ownership for the intervention and avoid duplication. As a result, multiple partners financed and supported the scale-up of cStock and DPATs to districts outside the original pilot districts. cStock, with DPATs, is now implemented and used in all of Malawi's districts. During the scale-up phase, partners financed and jointly

conducted the trainings with MOH, while the project provided technical support and quality control.

3. **Creation of a taskforce:** An MOH-led taskforce that includes key stakeholders was set up to monitor the progress of the scale-up, assist in resource mobilization, and contribute to the development of a five-year transition plan. The plan outlined a structured and deliberate process on how to sustain cStock and DPATs for the next five years and build capacity within the MOH to take full ownership of the system so that EM becomes a core business practice of the health system.
4. **Development of the National Product Availability Team:** The MOH also established a National Product Availability Team (NPAT) to manage the EM approach. This team meets to review data on performance and provide leadership and support as needed to ensure all districts can realize the full benefits of the EM approach.

Evaluation and Results

The project tested two different intervention packages: EM (cStock plus DPATs) and Efficient Product Transport (EPT) (cStock plus bicycle maintenance) over 18 months (2011–2013). Each package was tested in three districts, and four districts from the baseline assessment were used as a comparison group. The monitoring and evaluation strategy included three large mixed-method evaluations, one at baseline (2010), a second after the testing phase (midline—2013), and a third after the scale-up phase (endline—2014).

The midline evaluation compared the effectiveness of the two intervention groups (EM and EPT) in reducing stock-outs

and strengthening key supply chain processes. The evaluation compared results from baseline to midline and compared each intervention group with the non-intervention comparison group. cStock proved to be feasible and acceptable in all six districts; however, combining cStock with DPATs (three districts) resulted in significantly better supply chain performance and supply reliability.³⁻⁵

- Data visibility improved from baseline in all districts where cStock was implemented, but improved more significantly in EM districts: Results showed average CHW reporting rates of 94% in EM districts and 79% in EPT

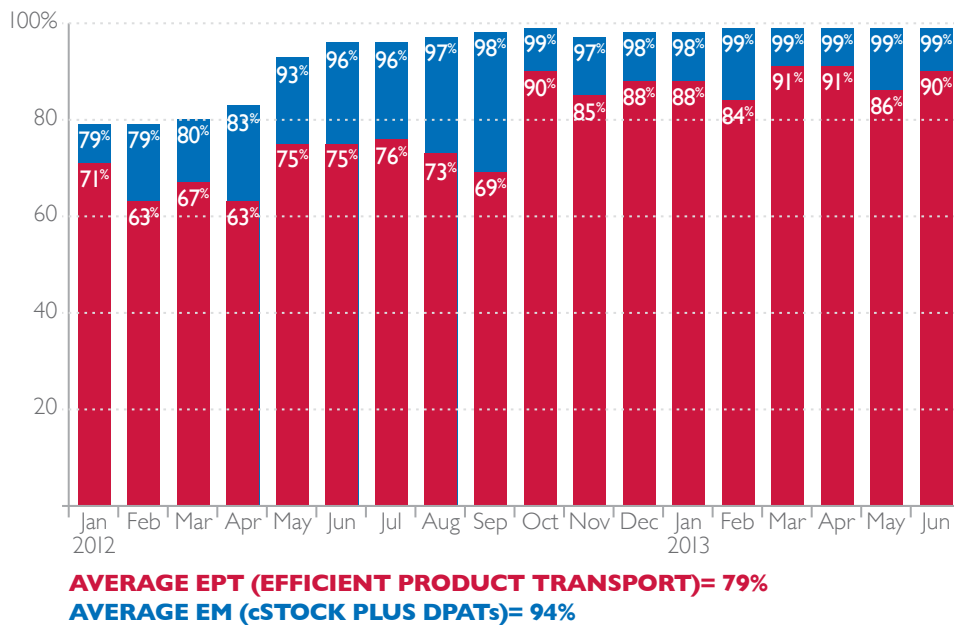


Figure 2.
Mean reporting rates to cStock by HSAs, on all commodities in EM (n=393) and EPT (n=253) districts, January 2012–June 2013

districts over the testing period (January 2012–June 2013). At baseline, only 43% of CHWs interviewed reported that they submit some kind of logistics report (see Figure 2 above).

- Supply reliability was found to be significantly higher in EM districts compared to EPT districts. Supply reliability was defined as the mean percent CHW stock-out rates by product over 18 months (January 2012–June 2013). Stock-outs for all products ranged between 5–7% in the EM group and between 10–21% in the EPT group. These differences were statistically significant at the $p=0.000$ level for all products (Figure 2).

The endline evaluation assessed scale, sustainability, and institutionalization. The evaluation consisted of qualitative case studies and quantitative analysis of cStock data in two original districts and two new districts. The results proved that cStock is easily scaled and provides a simple process for reporting on and resupplying community-level products in a systematic way. In addition, the benefits (coordination, communication, and collaboration) and challenges (transport, resources, and time) of the DPATs were quickly realized in the new districts and highlighted the importance of intense implementation support at the initial stages.⁶

Lessons Learned in Program Implementation and Scaling

The overarching lesson from this research is that mobile health strategies in isolation cannot create a reliable and robust public health supply chain. However, if these strategies are implemented as part of broader supply chain system strengthening activities that address the larger system constraints, mHealth solutions can be game changing. Other implementation challenges during development, deployment, and scale-up ranged from issues related to setting up the technology to the question of government readiness to assume ownership of the system after the initial implementing project ends.

Setting up a mobile information technology system: The two mobile network operators (MNOs) initially charged commercial rates for SMS messages. Recognizing the difficulties that the MOH would have in sustaining these costs without continued donor support, the project engaged in intensive advocacy efforts with both MNOs, urging them to provide

reduced rates as part of their corporate social responsibility to the health sector. The efforts proved successful, with one MNO providing a three-year waiver for SMS costs and the other reducing SMS costs by 40% and only charging for incoming messages.

Achieving broader ownership beyond a few champions: Turnover of district champions, staff who were the primary trainers and leaders for the EM approach at the district level, resulted in some loss of momentum for the uptake of cStock and for conducting DPAT meetings. It is important to plan for new staff training to ensure continuity and quality of intervention implementation. Training should also build a sense of ownership and develop champions. For instance, finding opportunities for district staff to attend larger meetings where they can proudly present their successes at a national level or across districts can motivate champions. To mitigate staff turnover effects, trainings during the scale-

up phase included more district-level staff and all program coordinators whose programs extend to the community level were included as DPAT members.

Developing MOH readiness for system maintenance and data storage / server hosting: Building capacity within the MOH to manage the cStock system has taken time and resources. The capacity to host the data in the private sector is still emerging. Therefore, the decision was made to outsource data storage and software maintenance to US-based companies. While outsourcing is the appropriate choice at present, in-country capacity for hosting and maintenance should be revisited as the program scales.

Future Plans

While most innovation projects strive to move from pilot to practice, achieving goals of scale-up and sustainability are often a challenge. Over the project period EM achieved full scale and began the journey toward being integrated as an organizational practice. Following the close of the SC4CCM project in 2015, JSI placed a secondee in the MOH for 12 months to transfer skills in managing cStock and the DPATs. The secondee worked closely with MOH staff to fully establish the NPAT and institutionalize national support for the innovation. cStock is now being funded through the Global

Fund grant, and MOH staff have taken full responsibility for all system administration for cStock and support for the DPATs. JSI no longer has staff dedicated to cStock and only provides ad hoc support to the MOH as needed. cStock continues to operate at full scale and is integrated into existing structures and processes for the CHWs. ■

Snapshot: cStock	
Geographic Coverage	Malawi
Implementation Dates	2011 to present
Implementation Partners	Malawi Ministry of Health (MOH)(implementing) JSI (design, pilot, and scale-up) Dimagi (software developers) Save the Children (scale-up) World Health Organization (scale-up)
Donor(s)	Bill & Melinda Gates Foundation (pilot) mHealth Alliance International Working Group Grant (sustainability) USAID/President's Malaria Initiative Global Fund
Contact Information	Sarah Andersson, Senior Technical Advisor, John Snow, Inc. (JSI), sarah_andersson@jsi.com

References & Additional Resources

Reports:

Strengthening Supply Chains at the Community Level: findings from the SC4CCM project in Malawi, Rwanda, and Ethiopia http://sc4ccm.jsi.com/files/2015/01/SC4CCM-Findings-Report_FINAL.pdf

From Pilot to Practice: lessons on scale, institutionalization and sustainability from the (in-progress) journey of the SC4MM project <http://sc4ccm.jsi.com/files/2014/11/Pilot-to-Practice-Brief.pdf>

Malawi Intervention Strategy for Improving the Community Health Supply Chain: Implementation and M&E Plan <http://sc4ccm.jsi.com/files/2012/10/Malawi-Implementation-Plan.pdf>

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