MALAWI

SC4CCM Project Endline Evaluation Report

September 2014

Malawi

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JSI

SC4CCM Project

The Improving Supply Chains for Community Case Management of Pneumonia and Other Common Diseases of Childhood Project is funded by the Bill & Melinda Gates Foundation under grant agreement no. OPP1002868, beginning November 2, 2009. The grant is implemented by JSI Research & Training Institute, Inc. The project aims to demonstrate that supply chain constraints at the community level can be overcome, and that doing so may yield significant improvements in the effectiveness, scale, and impact of iCCM. SC4CCM will identify, demonstrate, and institutionalize supply chain management (SCM) practices that improve the availability and use of selected essential health products for treating children under five in community-based programs.

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Cover photo: Health facility product availability team meeting

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Acronyms

ACT	artemisinin-based combination therapy (Coartem)
CCM	community case management
CMS(T)	Central Medical Stores (Trust)
CS	Cluster Supervisor
DHMT	District Health Management Team
DHO	District Health Office
DPAT	District Product Availability Team
DTC	Drugs Therapeutic Committee
EM	Enhanced Management
EO	emergency order
EPT	Efficient Product Transport
GFATM	The Global Fund to Fight AIDS, Tuberculosis and Malaria
HF	health facility
HIV	Human Immunodeficiency Virus
HPAT	Health Facility Product Availability Team
HSA	health surveillance assistant
HTSS	Health Technical Support Services
IMCI	Integrated Management of Childhood Illness
JSI	JSI Research & Training Institute, Inc.
LMIS	logistics management information system
MOH	Ministry of Health
MOS	months of stock
NMCP	National Malaria Control Program
OFR	order fill rate
ORS	oral rehydration salts
PA	pharmacy assistant
PAT	product availability team
RDQA	rapid data quality assessment
RSW	resupply worksheet
SC4CCM	Supply Chains for Community Case Management
SCM	supply chain management
SMS	short message service (text message)
SOH	stock on hand
SOP	standard operating procedures

Acknowledgements

Executive Summary

Background

In 2010, the Supply Chains for Community Case Management (SC4CCM) Project, with funding from the Bill & Melinda Gates Foundation, set out to increase availability of key medicines and commodities for treatment and management of sick children at the community level in three sub-Saharan Africa countries, Malawi, Ethiopia and Rwanda. Following a baseline assessment conducted in the first year of the project (2010), two intervention packages were designed and tested by the project:

1. **Enhanced Management Intervention (EM):** District Product Availability Teams (DPATs) were created to have a common goal around maintaining consistent product availability for community health commodities, and empowering those teams by improving data visibility and decision making capacity, and by recognizing supply chain performance.

2. **Efficient Product Transport Intervention (EPT):** addressed transportation and data visibility challenges between resupply points and health surveillance assistants (HSAs).

❖ A cross-cutting intervention, **cStock**, was included in both packages. cStock is a SMS-based reporting and resupply system, which aimed at making community level supply chain performance data significantly more visible.

In 2013, a midline evaluation was conducted to assess and compare the impact of the two intervention groups, EM and EPT, against a group of four non-intervention districts. Following the evaluation, the EM approach was subsequently endorsed by the Malawi Ministry of Health (MOH) for scale up.

An endline evaluation was conducted in 2014 after EM had been scaled up to 24 of 29 districts. The evaluation used a mix of quantitative survey and qualitative case study to systematically collect evidence on the scalability and sustainability of the EM approach, to assess progress made towards scale up and institutionalization goals during this period and to draw implementation lessons.

Key Findings

cStock has provided a simple process for HSAs to report on and HFs to resupply community-level products in a systematic way.

HSAs use the reporting procedures as designed and report to cStock routinely. Health facilities (HFs) mostly prepack orders and notify HSAs when the order is ready. However, the quantities of products resupplied to HSA are sometimes not based solely on the cStock recommended quantities, as was intended in the original design. Users of cStock could identify many benefits of the system and generally were very enthusiastic about the system but a number of challenges do need to be managed to ensure users continue to have confidence in the system.

The benefits and challenges of the PATs were quickly realized in the new districts, and were the same as original districts.

The product availability teams (PATs) are considered to be important for improving coordination, communication, and collaboration; however, at all levels meeting regularly is challenging due to issues of transport, resources and time. Performance monitoring and follow-up between levels to try and achieve the performance indicators was evident, facilitated by easily-accessible cStock data via the resupply worksheet and/or the dashboard. In exceptional cases, targeted routine supervision and remote support by phone were other opportunities outside the meetings for linking levels. Cluster Supervisors (CS) have not achieved their intended role of effectively linking healthy facility PATs (HPAT) and DPATs.

Product availability remains inconsistent and unreliable across both original and scale up districts and is affected by factors outside the control of the district staff and the DPATs.

While some high in-stock rates were seen, the lower "good" stock rates in all districts suggest that when HSAs are resupplied, they receive enough quantities to avoid stockouts but are not topped to maximum levels. It is likely that HFs are not able to top up to max due to chronic shortages, but they are rationing to avoid stockouts. If availability of CCM products remains unreliable, there is a risk that the motivation of HSAs and HF staff to use cStock correctly and routinely, and for HPATs to meet, will be reduced.

In most cases institutionalization has only just begun; however, there are risks to the institutionalization process.

The study found evidence of integration of EM into existing structures and processes: the establishment of structures (National PAT, DPAT, HPAT) within the MOH concerned with managing the EM approach, the routine use of cStock for reporting, and the reliance on cStock for data to monitor product availability and supply chain performance at the community level. However, in most cases, institutionalization has only just begun and there are risks to the institutionalization process, such as lack of product availability, staffing challenges within HTSS, funding for cStock, and staff turnover.

Recommendations

Based on the results of the endline evaluation, the following recommendations were jointly developed by SC4CCM and stakeholders:

1. *Improve operationalization of Product Availability Teams in all districts at all levels of the system*

For the benefits of the PATs to be realized, EM must be operationalized through reinforcing regular PAT meetings, performance monitoring, and assisting CSs to link HPAT and DPAT. Ideas to overcome the barriers to these meetings include: HF staff should align meetings with product collection and DPAT members should integrate DPAT issues with already existing district-level meetings. The role of Cluster Supervisor in linking HPATs and DPATs must be reinforced by training and mandating them to play this role and finding opportunities for them to play this role that are not resource intensive.

2. *Identify and secure cStock medium-term and long-term funding support*

Over the next five years, cStock should be integrated into the MOH systems and be supported financially and technically from within MOH. A five year transition plan outlines the steps necessary to do this.

3. *Strengthen institutionalization of the EM approach*

The NPAT has an important role in institutionalizing the EM approach by taking practical steps aimed at integrating EM into the standard MOH system structure and tools including: routine supervision checklists, new staff induction guidelines, standard operation procedures (SOP) and job aid, and basic CCM training package.

4. *Improve product availability at national level to ensure adequate availability at community level*

Products for the community level need to be available on a consistent basis at the central level which requires regular quantification and supply planning, stakeholder coordination and monitoring of the pipeline.

Conclusions

The Enhanced Management approach has proven to be successful in creating a supply chain where data is visible and used and where staff are motivated to take responsibility and work together to improve the performance of the supply chain. However ensuring that both cStock and the Product Availability Teams are sustained will require commitment and on-going support from stakeholders at all levels including implementing partners, MOH policy and the operational levels.

Background to the SC4CCM Endline Evaluation in Malawi

In 2010, the Supply Chains for Community Case Management (SC4CCM) project, with funding from the Bill & Melinda Gates Foundation, set out to increase availability of key medicines and commodities for treatment and management of sick children at the community level in three sub-Saharan Africa countries, Malawi, Ethiopia and Rwanda. Community Case Management (CCM) is a strategy of training community health workers (CHWs) to treat sick children in their communities, however while the project's primary focus was on ensuring CCM products were available, the project did include all products managed by community health workers in all interventions so as not to create parallel supply chains.

A baseline assessment conducted in the first year of the project (2010) identified key gaps in the community health supply chain and the project used these findings to design country specific intervention packages to be tested in each country. In Malawi, the SC4CCM project designed two intervention packages:

1. **Enhanced Management Intervention (EM):** To create a customer service oriented supply chain by developing teams that have a sense of urgency around maintaining consistent product availability for community health commodities, and empowering those teams by improving data visibility and decision making authority/capacity, and by recognizing supply chain performance and achievements by teams and individuals, to significantly improve product availability at the healthy surveillance assistant (HSA) level.

2. **Efficient Product Transport Intervention (EPT):** To address transportation and data visibility challenges between resupply points and HSAs to significantly improve product availability at the HSA level.

❖ Cross-cutting these interventions was a common solution called **cStock**, a mobile health (mHealth) logistics management information system, which aimed at making community level supply chain performance data significantly more visible.

In 2013, a midline evaluation was conducted to assess and compare the impact of the two intervention groups, EM and EPT, against a group of four non-intervention districts, provide evidence about cStock as an effective system for making community supply chain data more visible, and provide evidence around the interventions tested by SC4CCM to identify successful supply chain practices and support the Ministry of Health (MOH) of Malawi to identify and take action towards scaling up promising activities.

Key findings from the midline evaluation were:

- Product availability at community level had more than doubled from baseline to midline, the increase was driven partially by more products in the system, as well as the improvements in the supply chain system

- cStock achieved its objective by improving visibility of community logistics data

- EM showed the most promising improvements in supply chain practices and processes

- The EPT intervention was not as effective as EM, and findings showed the intervention did not take off as expected

Participants at the Midline National Data Validation Workshop recommended the scale up of the EM approach, with a few modifications based on lessons learned over the intervention period and feedback from district staff.

Since the midline, SC4CCM has been working with the MOH and implementing partners to coordinate the scale up and institutionalization of the EM approach nationwide. At the time of the endline evaluation, 24 of the 29 districts were implementing the EM approach; since endline four more districts have been trained with the final district due to be trained in October 2014 (see Appendix 1).

The endline evaluation used a mix of quantitative survey and qualitative case study to systematically collect evidence on the scalability and sustainability of the EM intervention, to draw implementation lessons from the intervention scale up process, and to assess progress made towards scale up and institutionalization goals during this period.

Description of the Enhanced Management Approach

The Enhanced Management approach promotes good supply chain practices and the use of data to inform decisions and improve supply chain performance with the aim of improving the availability of medicines for community health programs. This is done by making the two components of EM part of the standard practice of HSAs, health facilities (HF), and district staff. The two components of EM that work together to achieve this aim are cStock and district product availability teams (DPATs). The combined implementation of cStock and DPATs is referred to as the EM approach, as it enhances the management processes of the different supply chain related tasks that collectively work to improve availability of products at community level.

cStock

cStock is an SMS and web-accessible, open-source logistics management information system (LMIS) for reporting logistics data, calculating resupply, and managing and monitoring all community-level health products. cStock enables HSAs to use their own mobile phones to transmit monthly stock level data and receipts to a toll-free short code, with no additional hardware costs or financial incentives. cStock automatically calculates resupply quantities from reported data, and sends re-order quantities to supervisors at HFs, facilitating accuracy and reducing transport time and costs. With regular reporting of only two data items for the 19 medicines managed by HSAs, cStock is able to generate reports on more than ten supply chain indicators that program managers and partners can use for performance monitoring and supervision. At district levels and above, managers have access to a web-based dashboard (www.cstock.jsi.com) to monitor performance. cStock was designed to mimic the paper reporting & resupply system; cStock however does not replace the paper reporting system that collects many more data items than is possible through a SMS system such as cStock.

Figure 1: cStock Data and Product Flow
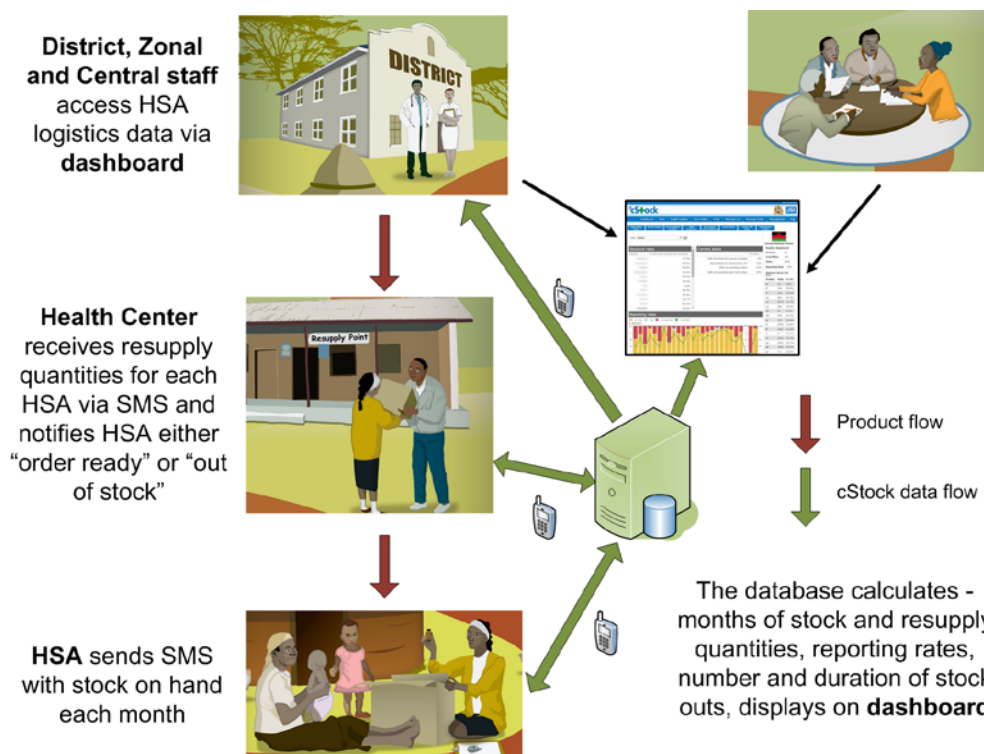
District Product Availability Teams (DPATs)

SC4CCM recognized that improved data visibility alone would not yield desired results without a deliberate mechanism that ensured that data were being used consistently and in a timely way to support effective problem solving. Thus, cStock was designed to be complemented by a team-led and goal-focused approach for regularly using the data for problem solving and timely, informed decision making. **DPATs** were formed with a shared vision and commitment to enhance proactive leadership in monitoring and managing product availability at district and HF levels. The teams meet quarterly at the district level and monthly at the HF level, have shared goals specifically around product availability and supply chain performance, and use cStock data to assess progress against established team performance targets, problem solve to address bottlenecks and challenges, develop action plans to improve on weak areas, and recognize and reward outstanding individual performance within teams to motivate people towards performance excellence.

The DPATs were intended to create links between the HSA, HF, and district. In practice, it was not possible for the whole team to meet regularly so the original design had two levels of DPAT meetings: one at HF level that includes health centre staff and HSAs, and one at district level with district staff and HSA Supervisors. Over time, the DPAT meetings at the HF level were renamed by many as HPAT (or Health Facility-level Product Availability Team), while the district level meetings retained the DPAT name. We found that in original districts, respondents still sometimes referred to both as "DPAT".

The DPAT has a number of core responsibilities that are expected to be carried out regularly with the aim of achieving the common goal of ensuring availability of products at the community level. Most of these responsibilities are performed during the DPAT and HPAT meetings, but can also be done throughout the month on a one-to-one basis. These activities include monitoring the performance indicators in the DPAT performance plan and recognizing good performing HSAs or facilities according to the recognition plan. Performance indicators as part of an overall performance plan are agreed upon by the DPAT at the time of the initial training and usually include such things as reporting rates, lead time duration, number of emergency orders (EO), order fill rates (OFR), and stockout rates. The recognition plan is also established at the time of this training. Team-based problem-solving related to improving performance indicators is also a key component of the DPAT and teams are expected to develop an action plan to achieve targets and better product availability. Interactions among HPAT/DPAT members, including during meetings, are meant to be recorded in a management diary, often referred to as the hardcover, referring to the type of notebook provided during the initial training for this purpose.

After midline, the link between the district and HF level was redefined. In the original design the HSA Supervisor was to be the link between the district and HF level by attending both DPATs and HPATs. However, this proved to be logistically very challenging and costly so the structure changed to instead have the Cluster Supervisors (CS) be the link between the levels by attending both DPAT and HPAT meetings, escalating unresolved issues from HPAT to DPAT and providing feedback back to the HPAT. The district level DPAT structure also expanded to include District Malaria and Family Planning Coordinators, as cStock also tracks products included in the Malaria, and Family Planning programs, HMIS Officers as well as the CSs.

Table 1: DPAT Structure Before and Changes Made After Midline

Before Midline	Changes After Midline
Quarterly district meetings with district staff and HSAs' Supervisors	CSs added to quarterly district meetings (DPAT) and HSA supervisors no longer included
Monthly HF meetings with HF and HSAs	CSs added to monthly HF meetings (HPAT) Session added to training on how to conduct an effective meeting
Performance plan developed that includes supply chain performance indicators and targets	
cStock data used to track performance using cStock print out report from district coordinators	Resupply worksheet modified to allow HPATs to track performance at HF level when cStock reports not available
Formal recognition system to drive supply chain performance	
Management diaries used to track issues and actions taken	
	Orientation of district health management team (DHMT) as a necessary component in EM structure

Tools used in implementing the EM approach include the resupply worksheet (RSW), management diaries, the cStock dashboard, and the standard operating procedures (SOP) manual and job aid cards. The **RSW** is a standard hand-drawn format, specified in the EM SOPs, used by the HF staff to record the SMS messages they receive from cStock and the quantities of each product they issue to HSAs. Specifically, the HF staff, HSA Supervisor or Medical Assistant, record the following for each HSA:

- HSA name and identification code

- Quantity of each commodity to be supplied to HSA per cStock (called Requested in RSW)

- Date message received from cStock

- Date when HF notifies HSA that supply is available

- Quantity of each commodity actually supplied to HSA (called Supplied in RSW)

- Date when HSA collects supply and HSA signature

Figure 2: Photo of Sample RSW

The **Management Diary** is used by the DPAT and HPAT teams to record the minutes of their meetings, actions required to solve problems and results. The **cStock dashboard** is used by district and central program and logistics managers and pharmacy staff to monitor supply chain performance and take action required to support and assist HSAs and HFs to ensure product availability at the community level.

In addition to these tools, during initial team formation, the DPATs develop **Performance Plans** which include district specific supply chain targets (e.g. HSA reporting rates, stockout rates, etc.) and

Recognition Plans for how improved HSA and HF supply chain performance will be recognized; these serve as references during DPAT and HPAT meetings and are used in monitoring community supply chain performance.

The **SOP manual** serves as the job reference manual for resupply procedures, use of cStock and its dashboard, the management of DPAT/HPATs, and overall community supply chain performance monitoring.

Piloting and Progress towards Scale

The EM approach, the combination of cStock and DPAT, was rolled out to the pilot districts - Kasungu, Nsanje and Nkhotokota - starting in June 2011 after a four month design period. At the same time, the EPT intervention, the combination of cStock and training in bicycle maintenance, was rolled out in three other districts – Nkhata Bay, Mulanje, and Machinga. SC4CCM piloted the interventions over an 18 month period from June 2011 to January 2013 and during this time provided implementation support and monitoring after the initial introduction of the interventions. Lessons learned during implementation led to some revisions to the interventions along the way. These six intervention districts are illustrated in the map at right in yellow.

Figure 3: Map of Partner Support for Scale Up of EM

Following the midline evaluation and the selection of the EM approach by the MOH for scale up, the MOH has rolled out the approach to additional districts through the support of its funding and implementing partners designated in the map. At the time of the endline evaluation all but four districts had been trained in the EM approach, with training in the remaining districts to be completed by October 2014. The original EPT districts, where cStock had been introduced during the pilot testing of the two interventions, have received training in DPAT and refresher training in cStock.

A **National Product Availability Team (NPAT)** was also conceived by the MOH at the time of the midline evaluation when the MOH identified the EM package for scale up and institutionalization. The NPAT is designed to support the DPATs in achieving their product availability goals by extending the community to district link to the central level of the supply chain. The NPAT is expected to be incorporated into LMIS review meetings, although these are not yet occurring regularly. The NPAT was launched in November 2013 with the following goal:

The goal of NPAT is to provide necessary technical and resource support to District Product Availability Teams (DPATs) to ensure consistent product availability in hard to reach areas by bridging the community level with the highest level in the supply chain.

To accomplish this goal, the role of the NPAT is, in the broadest terms, to:

- Monitor the community health supply chain at national level
- Provide coordination and support to DPATs at district level
- Provide a link between implementation level and MOH Central Management Levels

The NPAT membership includes the Senior Logistics Officer, Department of Health Technical Support Services (HTSS), who serves as the technical lead of the NPAT, HTSS Logistics Officers assigned to the programs (currently Family Planning, Malaria, Integrated Management of Childhood Illness (IMCI), and HIV Unit), HTSS LMIS Officers and Technical Assistants and representatives from partner organizations. To date, the NPAT has met three times, including the workshop held to establish it, and was oriented to use the cStock dashboard and database during the workshop.

A timeline of activities for the development, pilot and scale up of the EM approach is included in Appendix 2.

Endline Evaluation Methodology

The SC4CCM endline evaluation used a combination of quantitative monitoring data and qualitative case study methods. The purpose of the study was to explore the scalability, institutionalization, and sustainability of the EM approach introduced by the SC4CCM project. The study looked at how the EM approach (cStock + DPAT) contributes to improved supply chain practices and what changes can be attributed to the EM. This endline systematically collected evidence on two central concepts: scalability and sustainability of the EM approach designed and implemented as part of the SC4CCM project. In addition, the endline evaluation allowed SC4CCM to draw implementation lessons from the scale up process, and assess the progress made towards scale up and institutionalization goals during this period.

Over-arching Endline Evaluation Questions:

- To what extent (geographic breadth and institutional depth) have the SC4CCM interventions to support commodity availability at the community level been scaled up in Malawi?

- To what extent have the program effects of SC4CCM observed at midline been maintained at endline?

- To what extent have the interventions been institutionalized at endline?

- What aspects of the SC4CCM design, implementation, and overall project approach contribute to scalability and sustainability of the particular intervention supported in Malawi?

SC4CCM designed the EM approach to improve the community health supply chain by empowering teams through increased data visibility and decision making authority/capacity to monitor supply chain performance and act to ensure consistent product availability at the HSA level.

To explore how the EM approach is contributing to improved supply chain practices, and what changes are attributed to the EM approach, as identified by HSAs, HF staff, and district staff, the SC4CCM endline evaluation used both quantitative monitoring data and case study data collection methods. Appendix 3 depicts the conceptual framework, the Program Theory, used to structure the endline evaluation, which aimed to answer questions related to intervention operationalization, scale up, institutionalization, and potential sustainability. Each element in the box and arrow diagram was used to determine the types of data and data collection techniques that would be needed, and which would be best collected using cStock data and which through the case study (Table 1).

Table 2: Data Collection, Following Endline Evaluation Conceptual Framework

Conceptual Framework Element	cStock Data	Case Study
SC4CCM direct inputs for pilot		X
cStock training, software platform, resupply procedures, dashboard		X
DPAT training, performance plans, recognition plans, management diaries, resupply worksheets		X
Roll out approach for cStock and DPAT		X
HSAs and HF staff use cStock correctly	X	X
DPATs meet and use cStock for supply chain performance		X

monitoring		
NPAT established and functional		X
Product availability data visible and used for decision making	X	X
Scalability of EM	X	X
Institutionalization of EM		X
Improved product availability at CHW level	X	X
Contextual factors		X
Mediating factors		X

In the original pilot districts, the endline evaluation aimed to understand the potential sustainability of both intervention operationalization, as well as, effects of the intervention and progress towards institutionalization of the intervention. In addition, DPATs had scaled up to districts previously just using cStock (EPT districts) and the full EM package scaled up to other districts outside the pilot areas, providing the opportunity to assess scalability in both models of scale up districts. We used the following definitions for scalability and institutionalization, as defined by the project in the Pathway to Sustainability Tool[1]:

Scalability is the ability to replicate a proven supply chain innovation and extend that innovation broadly and successfully, through thoughtful implementation design and advocacy, to be adapted and adopted to support the national CCM program, while achieving the desired benefits of improved product availability.

Institutionalization occurs when the innovations that have been developed and proven successful are adapted for and integrated into the structure and systems of the organization responsible for providing and supporting CCM services, in most cases the MOH, and that the innovation becomes a standard business practice of the organization.

The process of implementing or scaling up can produce factors that contribute to institutionalization, and vice versa. The main distinguishing feature between scalability and institutionalization is the approach taken to ensure a shift in responsibility for and ownership of the innovation by a dedicated supply chain management (SCM) organizational unit within MOH. Institutionalization is also considered a prerequisite for ensuring that any gains in supply chain performance, namely product availability, associated with the innovations can be sustained.

SC4CCM considers that to be sustainable, the innovation which becomes a standard practice should be part of an integrated SCM system, although we recognize that sustainability is more than integration. The specific attributes which characterize an integrated supply chain have been articulated for public health[2], and adapted here for SC4CCM endline evaluation purposes.

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[1] SC4CCM Project Team. 2012. *The Pathway to Supply Chain Sustainability: A Planning Tool for Scaling &Institutionalizing Innovations within Public Sector Supply Chains*. Arlington, Va.: SC4CCM. http://sc4ccm.jsi.com/files/2012/11/Pathway-to-Supply-Chain-Sustainability-Tool.pdf

[2] John Snow, Inc. Getting Products to People: The JSI Framework for Integrated Supply Chain Management in Public Health, 2012.

In an integrated supply chain "people, functions, levels, and entities of the supply chain are linked and managed under an interconnected supply chain organization. Supply chain managers are empowered and understand how to collect and use information to map the system and streamline processes, use resources more effectively, monitor and improve performance, and align various supply chain processes to achieve common goals."[1]

The long-term goal is the development and implementation of an *integrated supply chain*. SC4CCM did not directly try to achieve this, but strove to contribute by including considerations for an integrated supply chain both in the design and implementation process for the interventions, and used two cross cutting principles to guide its approach. The first principle designed the intervention with an eye to maximizing its affordability and feasibility of implementation so that it could be scaled up relatively easily to other districts if the practice proved to be effective. The second principle implements the intervention in a way to facilitate its absorption by the existing SCM system, by streamlining procedures where possible, aligning with higher levels, and creating strong management practices that allowed for flexibility and agility.

The endline assessment was conducted by JSI in partnership with a subcontractor with technical expertise in case study evaluation methods (George Washington University), in collaboration with the MOH. This endline data collection started in June 2014 and concluded in July 2014. Endline results are intended to be used to assist the Malawi MOH, other districts in Malawi, and potentially other countries in efforts to adopt, scale up, and sustain evidence-based strategies for improving the CCM supply chain.

Quantitative Methodology

The cStock system was designed not only as an LMIS but as a tool for monitoring and evaluation, and as such, was designed to collect and visualize key supply chain indicator data over time. For the quantitative component of the endline evaluation, data for several key supply chain indicators were extracted from cStock to measure the performance of the community health supply chain between midline and endline (January 2013-2014).

Prior to the decision to use cStock for evaluation purposes, the project answered some fundamental questions about data quality related to CHW inputs to the system by conducting a Rapid Data Quality Assessment (RDQA) in 2013. While this RDQA showed that more than a third of reports sent to the system had problems, the results showed similar data quality challenges in both original and new districts, strongly suggesting that data quality does not change substantially over time or with experience. This established a reasonable expectation that data quality would remain constant and not affect the true changes in performance seen between midline and endline.

In addition to establishing consistency in quality, using cStock data for the evaluation instead of a traditional facility-based survey allowed access to a much larger sample size of both districts and HSAs in Malawi. Unlike a survey, which measures change between two points in time only and does not show whether change is consistent and sustained, cStock allowed project staff to view supply chain trends by monthly intervals and compare them across pilot districts and more recent adopters. The analysis of cStock data facilitated a clearer and deeper understanding of whether the innovation effects on supply chain performance were sustained in the pilot testing districts, and whether new districts were beginning to see the same kind of trends.

Summary of cStock data extractions:

- Source data reports queried for HSA performance include:
    - Stock status, stockouts, reporting, OFR, lead times, EO

- Queries made by:

  – *District*: two original EM (Kasungu and Nsanje), two scale up (Nkhatabay and Thyolo), and national – all active districts (24 at the time of analysis)

  – *Time frame*: January 2013 – May 2014

  – *CCM products*: cotrimoxazole 480mg, LA 1x6, LA 2x6, ORS, zinc 20mg

Sample Size

Below are the approximate sample sizes for the case study districts and national figures in the cStock analysis presented throughout this report. For districts the sample sizes are approximate as the number of HSAs registered in cStock can vary slightly from month to month for each district depending on if new HSAs join cStock or HSAs leave cStock. These figures are based on current registration figures.

Table 3: Approximate Sample Size for Each Case Study District for cStock Analysis

	Date Trained in cStock	**No. HSAs Registered (October 2014)**
District A	Oct 2011	57
District B	Aug 2011	181
District C	Jun 2011	234
District D	Oct 2013	48

For the national figures, the number of HSAs registered in cStock was increasing over the period of the analysis as more districts were trained. Below are the approximate sample sizes as they increased over the 17 month period of analysis. It should be noted that from January 2012 until October 2012 only the original six SC4CCM districts (both EM and EPT) were using cStock, then starting in October 2012 scale up of cStock began.

Table 4: Approximate Sample Size for National Figure by Month for cStock Analysis

Month / Year	**Number of HSAs Registered in cStock**
January to October 2012	631
November to December 2012	755
January 2013	966
February 2013	1279
March to April 2013	1453
May 2013	1513
June to July 2013	1619
August to October 2013	1748
November 2013	2122

December 2013 to January 2014	2168
February to May 2014	2512

Case Study Methodology

The aim for the case study component of the SC4CCM endline evaluation was to collect evidence on the potential sustainability of the interventions in the original pilot districts and to draw implementation lessons from original and scale up districts to assess the scalability of the interventions in order to support future scale up. Case study data were also used to assess the progress made towards the institutionalization goals of the project. Because institutionalization, scalability, and sustainability are not concepts that can be easily measured with quantitative surveys, and indicators are difficult to use for fully understanding implementation processes, a case study methodology was used to assess these concepts and processes, and the nature of the relationships among these concepts and processes.

Specific questions addressed by the case study:

- Have the effects observed at midline been sustained at endline in original districts? Why or why not?

- To what extent (geographically and operationally) have the innovations been scaled up? cStock? DPAT?

- What factors affect successful operationalization of the mobile-based resupply procedures? Specifically, what role does the DPAT play?

- What factors affect successful operationalization of the DPAT?

- To what extent have the components of the EM been incorporated in routine work (standard business practice)?

- To what extent have responsibilities for supporting community-level SCM been incorporated at other levels (district, central)?

The conceptual framework figure (Appendix 3) also shows, in large arrows, the primary contextual and mediating factors that were hypothesized to have affected both the effectiveness and implementation of the SC4CCM innovations. The case study specifically explored *how* EM is being implemented, and *how* the EM may or may not be facilitating HSAs to do their work in improved supply chain practices, focusing on the influence of the *contextual and mediating factors*, the *relationship* between these factors and use of cStock and HPAT/DPAT.

Case selection

First, we selected the two original intervention districts that were highest and lowest performers in terms of product availability as measured between baseline and midline. This would give information on the "extremes" of the range of product availability effects to assess for sustainability. In each original district, two HFs that were high performing on on-time reporting were selected, with one having a high and the other a low number of HPAT meetings held.

Then we selected two scale up districts based on the model of scale up implementation being followed – one was purposively selected to represent the EPT model experience (additive DPAT model-selected purposefully based on more stable IMCI Coordinator leadership) and the second was randomly selected from among districts recently trained in the full package with partner support. In each district, as there was no data available on regularity of HPAT meetings, two HFs were purposefully selected for their on-time reporting rate – one high and one low reporting.

Only HFs with more than three HSAs associated were considered for HF selection in both original intervention and new districts. We asked the HF staff to select two HSAs each to be included in the case study – one from a village that was far from the HF, and one from a village close by. See Appendix 4 for case selection schematic and Appendix 5 for performance indicators.

Case study data collection

The case study used the endline evaluation conceptual framework to structure data collection and focused on getting information on each of the elements in the framework. We used a variety of data collection techniques and inquiry strategies for triangulation (Table 4).

Table 5: Data Collection Activities During SC4CCM Endline Case Study

Levels	In-depth Interviews	Observations of Tool Use	Photos
Central – MOH, partner	4	-	-
District	15	6	14
Health Center	24	16	44
HSA	16	-	-
Total	59	22	58

Qualitative interviews were conducted with district staff, HF staff, and HSAs. Qualitative data was also collected at the central level from key MOH and other stakeholders. At the HF level, we conducted semi-structured in-depth interviews with three key staff - Cluster Supervisor, HSA Supervisor, and Health Facility In-Charge. HSAs were interviewed at the HF. At the district level, where possible, we interviewed at least three key staff: IMCI Coordinator; District Health Officer (DHO) (District Medical Officer if DHO not available); and the Pharmacy Technician. Depending on the role each played in EM, we used other data collection techniques in addition to in-depth interviews. (See Appendix 6 for a complete list of data collection exercises used at each level.)

Analysis of Endline Data

cStock data was analyzed by SC4CCM headquarters staff. Findings from the cStock analysis informed further focused analysis of the case study data. Case study and cStock data were analyzed separately and results triangulated to identify concordance and discordance.

Preliminary analysis of the interview transcripts was done by the qualitative data collection team after finishing in each district and was documented as a district summary. More formal analysis of the transcripts from the case study interviews was first conducted by the data collection team, SC4CCM project and MOH staff who conducted the interviews, and by SC4CCM headquarter staff who joined the field team for the in-country analysis workshop. Key areas for analysis were identified and prioritized and three selected for a deep dive into the qualitative data transcripts and photos: resupply process, DPAT/HPAT and product availability. Data were first examined by district, starting with the HSA interviews, then HF interviews, then district. General statements about each area were then developed after team discussion of district data review.

Second stage analysis after the in-country workshop involved comparing findings from original intervention and scale up districts, identifying evidence of institutionalization, and formulating lessons from scale up before being developed into the key findings statements presented in this report. Central level data were incorporated at this stage. Specific themes and topics that were identified during the in-

country analysis workshop were analyzed by different team members, and the findings reviewed by the entire team.

Case study and quantitative data were then triangulated to identify concordance, discordance, and explanatory relationships. When concordance among findings between the two sources of data were found, we used the two sources of data to reinforce findings and to provide more in-depth information on the processes and experiences of users of cStock and participants in HPATs and DPATs. We found very few instances of discordance between quantitative and qualitative findings. Data from both sources are presented under each major finding.

Relevance of the Endline Evaluation Findings

The cStock data are a census that includes all active HSAs in the district; therefore results from the quantitative data are generalizable to the districts from which data were extracted.

The case study purposively selected districts and HFs as case units, focused on ensuring representation from the different models of implementation and performance:

- Two of the original EM districts were selected based on performance (product availability at midline), HFs were selected based on performance (high reporting rates, low and high meeting occurrence)

- One original EPT district (called a scale up EM district in this report), which began using cStock in 2011 and where HPAT/DPAT was introduced in October 2013 with support from SC4CCM

- One scale up district where the district received training on the full EM package, HPAT/DPAT and cStock, through support from an implementing partner in October 2013.

The intent was to learn from the different implementation approaches and spectrum of performance to understand how and why the EM approach worked in the case units, which would be relevant outside the cases studied. The results from the case study are transferable to other districts operating in similar contextual situations as the selected case units. Because we used product availability as case selection criteria for districts and on-time reporting to cStock for HFs, and accessibility to HF for selecting HSAs, these criteria can be used to determine how similar the experience of other districts and HFs might be to those in the case study. In the absence of district and HF product availability data, the district level context can be used instead to determine comparability of HF contextual situation and transferability of case study results.

This report presents key findings based on both the quantitative and case study data, following the outline provided by the final program theory in Appendix 7; therefore generalizability is determined by the transferability of the case study findings. Overall, our assessment is that the contextual situations of the four districts, eight HCs and 16 HSAs in our case study sample are not atypical, and the results should be transferable to the majority of districts and HCs in the country.

Key Findings: Introduction

In this report the findings are divided into four sections, first discussed are the two components of EM, cStock and product availability teams, then data on product availability are analyzed since the inception of cStock, and finally progress made towards institutionalization of EM are discussed.

1) cStock Reporting and Resupply Process

2) Product Availability Teams

3) Product Availability

4) Institutionalization of EM

The extent to which the two components of the EM approach have been scaled up and sustained since inception, factors affecting roll out and operationalization, reasons why or why not they have been sustained are also discussed.

Case study findings are supported by relevant quotes from respondents during the interview. Not every quote is included in the results but quotes that best describe the finding are included; however all transcripts were analyzed to see common themes to understand when the different findings were reflected in all or majority of districts and health facilities, and when findings were unique to certain districts or HFs. When findings are unique, these will be indicated in the text. Quotes are presented in a way to keep the respondents anonymous: first the position is mentioned, then the district letter, then the number for the facility or HSA.

Context: Training on EM components

Table 5 below outlines when trainings were conducted in each district for cStock and DPAT either by the project or a partner project and then the respondents who reported receiving training during the interviews. This table provides some context to the case study findings, as we can see a number of the respondents did not receive the original training provided by the project or the implementing partner, but received on the job training or other less formal trainings later (blue cells). This has the potential to affect their understanding of the intervention depending on the quality of training. There were also a number of respondents who said that they did not receive training at all (yellow cells) highlighting some challenges related to staff turnover, which has the potential to impact the sustainability of this intervention if these people do not receive any training. This will be further discussed under the institutionalization section.

Table 6: Training on EM Package in Case Study Districts

District		Training Type	Training Dates (Project)	HF 1*					HF 2*				
				HSA 1	HSA 2	HSA Super-visor	HF In-Charge	Cluster Super-visor	HSA 1	HSA 2	HSA Super-visor	HF In-Charge	Cluster Super-visor
Original EM	A	cStock Training	Oct 2011 (JSI)	√	√	√	OJT	2012	√	√	√	Not trained	2014
		DPAT Training	Oct 2011 (JSI)	√	√	√	√	2014	√	√	√	Not trained	2014
	B	cStock Training	Aug 2011 (JSI)	√	√	√	√	Not trained	2014	2013	2014	√	√
		DPAT Training	Aug 2011 (JSI)	√	√	√	√	Not trained	Not trained	2013	Not trained	Not trained	√
Scale Up	C	cStock Training	Oct 2013 (Partner)	√	√	√	√	√	√	√	√	√	√
		DPAT Training	Oct 2013 (Partner)	√	Not trained	√	√	√	√	√	√	√	√
	D	cStock Training	June 2011 (JSI)	√	√	Oriented 2013	√	2013	√	√	√	deputy interviewed	2013 (TOT)
		DPAT Training	Oct 2013 (JSI)	√	√	√	√	Not trained	√	√	√	deputy interviewed	2013 (TOT)

* Based on interview responses

Key Findings: cStock Reporting and Resupply Process

The findings in this section draw from the both the cStock and case study data. cStock analysis was conducted on key indicators that are part of the reporting and resupply process, such as reporting rates, OFRs and lead times. Case study data on cStock include in-depth interviews with members and review of the previous three entries in the management diary. It should be noted that although District D is described as a scale up district, it is only the HPAT/DPAT component that was part of the scale up post midline, since the use of cStock for reporting and resupply had been begun in 2011. In reviewing these findings, it is important to consider if the HPAT and DPAT component improved the reporting and resupply process.

HSA Role in Reporting to cStock

All HSAs visited in the case study, from both original EM and scale up districts, demonstrated **a good understanding of their reporting responsibilities**, namely they knew they were to report stock on hand every month to cStock, to report receipts to cStock when they collected products and to send an EO when stocks were low.

There are three different types of reports that an HSA could submit through cStock:

- Stock-on-Hand – HSAs are expected to send a report of their stock on hand for each product at the beginning of **each month**

- Resupply receipt - once HSAs receive the resupply of products from the health center, they should send a receipt message; expectation is at least one receipt is sent **each month**

- Emergency orders – HSAs should report an EO **only** when their products reach the EO point (one treatment) and they require an EO, in a well-functioning supply chain this should be a rare occasion and should be due to an unpredictable increase in demand.

"In a month I send SOH and when I am responded to and I come to collect products and then I also send a report acknowledging receipt. But if in the middle of the month I run out of some products I also send emergency order." HSA A1.1, original EM

"How often do you use cStock?"
"For SOH at the beginning of each month (first day of each month), but in the middle of the month I send EO. For example, when I want to send SOH, I go to messages; I write SOH, space, write product name, space, amount, space until I finish all the products I manage at my village clinic." HSA B1.1, original EM

"I use it for ordering drugs and this I do by sending SOH; emergency order I also use cStock and if I want to ask drugs from a fellow HSA I also use cStock" HSA C2.2, EM scale up

"I use it once or twice in a month, oooh! No, I use it twice a month. Because at the beginning of each month I send SOH, and when health center says that my products are ready, I go and collect and then I send REC so its twice a month" HSA D2.1, DPAT scale up

In their responses on how they use cStock, the HSAs in both original and scale up districts also confirmed that they wait for the HF to notify them that their order is ready, and then when they collect their supplies, they send a receipt. This is in line with the recommended process as outlined in the SOPs.

"I first count the total number of drugs used against cases seen. I send a report on what is left on my drug box, the system acknowledges receipt of the message. Then the order ready message comes on my phone. I go to the facility then collect the drugs then I send a receipt message, then the system acknowledges receipt of my message again. During the mid-month I do send emergency order if my stocks are low" HSA C2.1, EM scale up

Monthly Reporting to cStock by HSAs

The case study findings are supported by the quantitative data from cStock which show that reporting rates for stock on hand (SOH) reports in all four districts is consistently above 80% and often greater than 90% (Figure 4) and is equal or above the national reporting rate. Table 6 demonstrates that for the two original EM districts, the reporting rates have been maintained since midline despite a reduction in intense support from the project. For the district that was new to cStock (District C), there are high rates of reporting to cStock for the period of time they have been using cStock. For the district where cStock was implemented in the pilot phase but DPATs were only introduced recently (District D), we see high reporting rates but no change in reporting rates after the establishment of DPATs. This reinforces the finding that good reporting practices using cStock can be rapidly achieved, and sustained, even without the DPAT part of the EM intervention.

Figure 4: Monthly Report Rates by District and Nationally
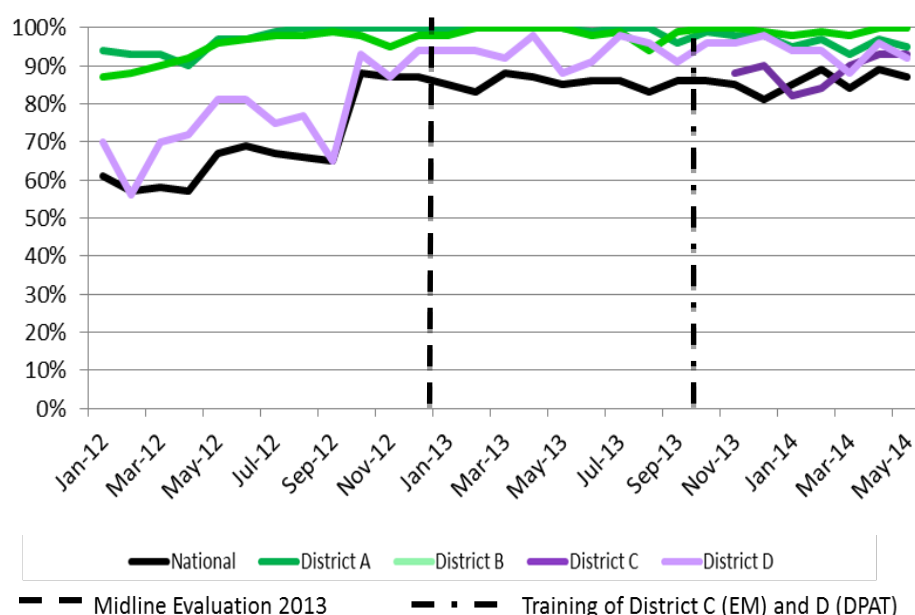
Table 7: Average Reporting Rates for Each District Before and After Midline

Original EM Districts	Before midline (Jan 2012 to Dec 2012)	After midline (Jan 2013 to May 2014)
District A	97%	98%
District B	95%	99%

20

Table 8: Average Reporting Rates Before and After Training

Scale Up Districts	Before Training (April 2013 to Sept 2013)	After Training (Oct 2013 to May 2014)
District C (EM)	N/A	89%
District D (DPAT)	94%	94%

In considering the timeliness and completeness of reporting, the original EM districts have maintained high levels for both parameters since the midline (Figures 5 and 6). District C saw improvements in completeness and timeliness in March 2014 which was also the time of DPAT review meetings and could explain the sudden improvement in performance. On-time reporting has been erratic for District D and the sudden drop in on-time reporting for May/June 2013 is not clear, however the addition of DPATs did not seem to have much impact on either completeness or timeliness. National on-time reporting has also been erratic, however it appears less erratic over time even as new districts have been added.

Figure 5: Monthly On-time Reporting Rates   **Figure 6: Monthly Complete Reporting Rates**
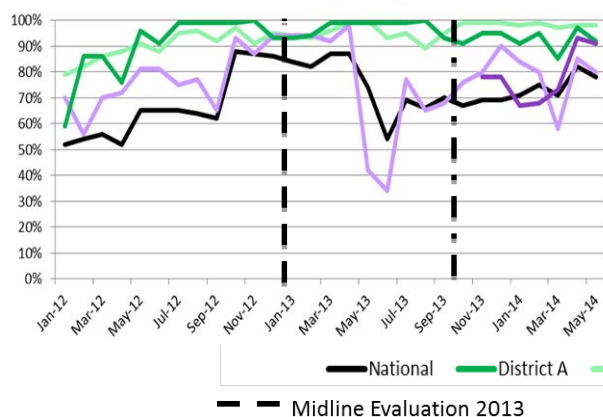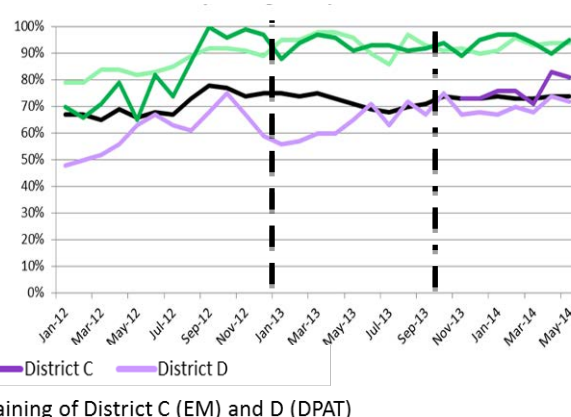
Use of cStock for Emergency Orders

The cStock system includes a process for HSAs to request emergency resupply during the course of the month if their stocks are low (EO point equals one treatment left), using the EO process. All HSAs now know to use cStock to submit an EO. A few HSAs in the recent scale up district were not aware at first that they could make EOs, but this was rectified through supervision.

> *"You mentioned that some HSAs are not competent, with what things is this in regards to?"*
> "*If they have stockouts or emergency orders, they don't know what to do, but HSA Supervisors help them."* Cluster Supervisor, HF C2, EM scale up

Although HSAs are aware of how to submit an EO and that they should send an EO when they have low stocks during the month, some HSAs wait until they are stocked out to initiate an EO rather than submitting when they reach the EO point with only one HSA in a scale up district mentioning the EO point.

"But if in the middle of the month I run out of some products, I also send an emergency order." HSA A1.1, original EM

"....when my products are finished I send an emergency order." HSA B2.2, original EM

"Some drugs were not enough so I asked why the HSA hadn't pressed the emergency order to cStock. He answered that he was waiting until the drugs finished, and I said 'No! Press the emergency when you have a few tablets. Don't wait until you finish your stock'." HSA Supervisor, HF C2, EM scale up

"If I have stockout I am sending an emergency order..." HSA, D1.1, DPAT scale up

One HSA mentioned sending an EO when their stock levels reached the EO point

"…cStock is helping me not to have stockouts of products because when I reach the emergency order point I send my emergency order so that products are not scarce and the community that I serve does not go back at times because I don't have products in stock. In the past the community could stay for some time without products." HSA, C2.2, EM scale up

In some instances when HFs are unable to supply or have to undersupply HSAs at the beginning of the month because of insufficient product quantities at the HF, HF staff will call the HSAs when products arrive at the HF and tell HSAs to submit EOs. In the case of one original district, this is planned each month. Because the HFs rarely have sufficient quantities at the beginning of the month to resupply HSAs fully, when the HF received supplies from CMST later on, it has become a standard mid-month procedure that the HSAs are asked to submit an EO to cStock to initiate a supplemental order-resupply process.

"So when we receive CCM products mid-month, we tell them to send an emergency order because we know that we didn't give them enough products at the beginning of the month. So we tell them to send an emergency request and we respond to their message and tell them to come collect products." HF In-Charge, HF B1, original EM

The quantitative analysis shows that District A (original EM) and C (DPAT scale up) have EO rates below the national average. For District D, EOs appear to increase after the DPAT trainings, possibly as the DPATs have improved relationships and reinforced the importance of using this function when stocks are low rather than waiting until there is a stockout or until the beginning of the following month. District B, where as described above it has become a standard mid-month procedures for HSAs to send an EO, has a greater number of EOs than the national average.

Figure 7: Average % of HSAs Submitting Emergency Orders Across 5 CCM Products

Table 9: Average % of HSAs Submitting EOs for Original EM Districts Before and After Midline

Original EM Districts	Before midline (Jan 2012 to Dec 2012)	After midline (Jan 2013 to May 2014)
District A	4%	4%
District B	13%	11%

Table 10: Average % of HSAs Submitting EOs Before and After Training

Scale Up Districts	Before Training (April 2013 to Sept 2013)	After Training (Oct 2013 to May 2014)
District C	N/A	7%
District D	2%	5%

Health Facility Role in using cStock to Resupply HSAs

HF staff are required to complete a number of tasks once they receive the request message from cStock to resupply the HSAs. First, they must record the request message received from cStock in the RSW, then prepack the orders based on the cStock request, record the actual quantities issued on the RSW, and then finally they must send a message to the HSA via cStock to say that the order is ready for collection. It is expected that the HSA Supervisor is responsible for maintaining and recording all information (both the quantity requested and quantity issued) in the RSW, but must work closely with the Health Facility In-Charge to pick and pack the order as the HSA Supervisor does not have access to the drug store. The

following HSA supervisor from one of the original districts described the process exactly; in some HFs there was some slight variation in how the process was carried out and who is involved in the process, but generally the HSA Supervisor did coordinate with drug store staff to prepare the orders.

> *"After getting a message, I document the information in this one [pointing to the notebook that had the RSWs]. Then, we coordinate with the In-Charge to prepack the drugs, then I respond to the orders so that the HSAs can come collect the supplies."* HSA Supervisor, HF B2, original district

Consistent and Correct Use of Resupply Worksheet

HSA Supervisors interviewed as part of the case study reported that they use the RSW consistently to document the HSAs' requests for additional supplies; this was confirmed by the case study team's observations of the previous month's RSWs. Comparing RSW use across the case study districts, we found that in the original EM districts there is more **consistent and correct use of RSWs** as well as **consistency in who is responsible for the RSW,** whereas in the scale up districts there was less consistency in who is responsible for the RSW (District C) and use of the RSW in District D was found to be less correct and consistent (Table 10). The lack of consistency may not be a problem as long as the staff member is adequately trained and the staff member is included in the HPAT so that they can raise issues.

The less correct and consistent use of the RSW in District D made it difficult to use the RSW to monitor the resupply activity or corresponding performance indicators and put into question their accountability for issue quantities. In one HF, the RSW was only partially completed, recording only the quantity required via the cStock message; the quantity supplied was not routinely written in the RSW. In the other HF, only the June 2014 RSW was observed; it was reported by the HSA Supervisor that the other RSWs were around, but that he struggled to keep them organized because he did not have a file for them. The RSW was hand drawn, as expected, but did not include the dates of request, resupply or collection, nor the quantity collected and signature. The HF used the Village Clinic Report to capture the goods received signature. District D received training on the RSW during the original cStock training in 2011 and was trained on the new format during the DPAT/HPAT training in 2013; it may be this that has caused some confusion on how to use the RSW.

> Observation of RSW at HF 2, District D:
>
> *HSA Supervisor says he only uses the RSW to record products HSAs need and records the amount cStock tells him. There is nothing filled in on the RSW as far as how many products HSAs were supplied with; there is also no signature or date HSAs picked up products. He said he gives products to HSAs and how much is given is recorded on the stock card found in the stock room.*

Table 11: Consistent and Correct Use of Resupply Worksheet in Case Study Facilities

	Original Intervention				Scale Up			
	District A		District B		District C		District D	
	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2
Person Responsible for RSW	HSA Supervisor	HSA Supervisor	HSA Supervisor	HSA Supervisor	Community Health Supervisor	HF In-Charge	HSA Supervisor	HF In-Charge
Consistent Use	Reported monthly use: not observed	Observed monthly use since Sept 2012	Reported monthly use: observed June 2014	Reported monthly use: observed June 2014	Reporting monthly use: observed June 2014	Observed monthly use since Nov 2013	Observed June 2014, others not available	Observed Oct & Nov 2013 and Feb-May 2014; no June 2014
Correct Use*	Not observed	Fully complete and correct	Fully complete and mostly correct	Fully complete and correct	Fully complete and correct	Fully complete and correct	Incomplete but correct for quantities included	Complete only for Nov 2013, others missing data
Comments		Status requested/ supplied not included until June 2014				Started using hard cover April 2014. Nov 2013-March 2014 RSW was on loose paper, now stapled to hardcover.	RSW was written on a piece of blank paper; no filing system for RSWs no dates or signatures on RSW	Pre-printed RSW used for October 2013-May 2014

*Correct refers to where the quantity written on RSW matches the quantity requested through cStock. HF reports were printed from cStock before the interview and compared with the RSW.

Use of cStock to Inform Resupply

It was expected that HF staff would resupply HSAs based on the request quantities calculated by cStock and sent via SMS to the HSA Supervisor and the HF In-Charge, hence reducing the burden of calculating resupply quantities. However case study findings show that HF staff **do not use cStock exclusively to determine how much to resupply,** but use a variety of sources of information to determine how much to resupply an HSA, and **generally HSAs are supplied with less than cStock requests.**

The quantitative data shows that generally for CCM products, HFs are under-filling the HSAs compared to the quantity requested through cStock. OFR is determined by comparing the quantity requested with the quantity actually supplied; ideally the OFR should fall between 80% and 120%. There does not seem to have been much variation in OFR before or after midline or before or after training.
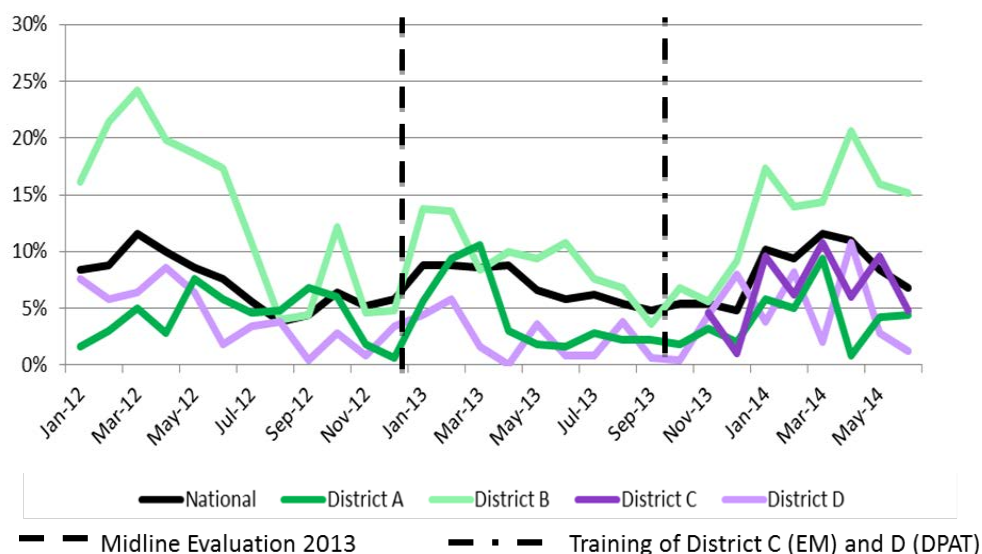
Figure 8: Average OFR Across All 5 CCM Products
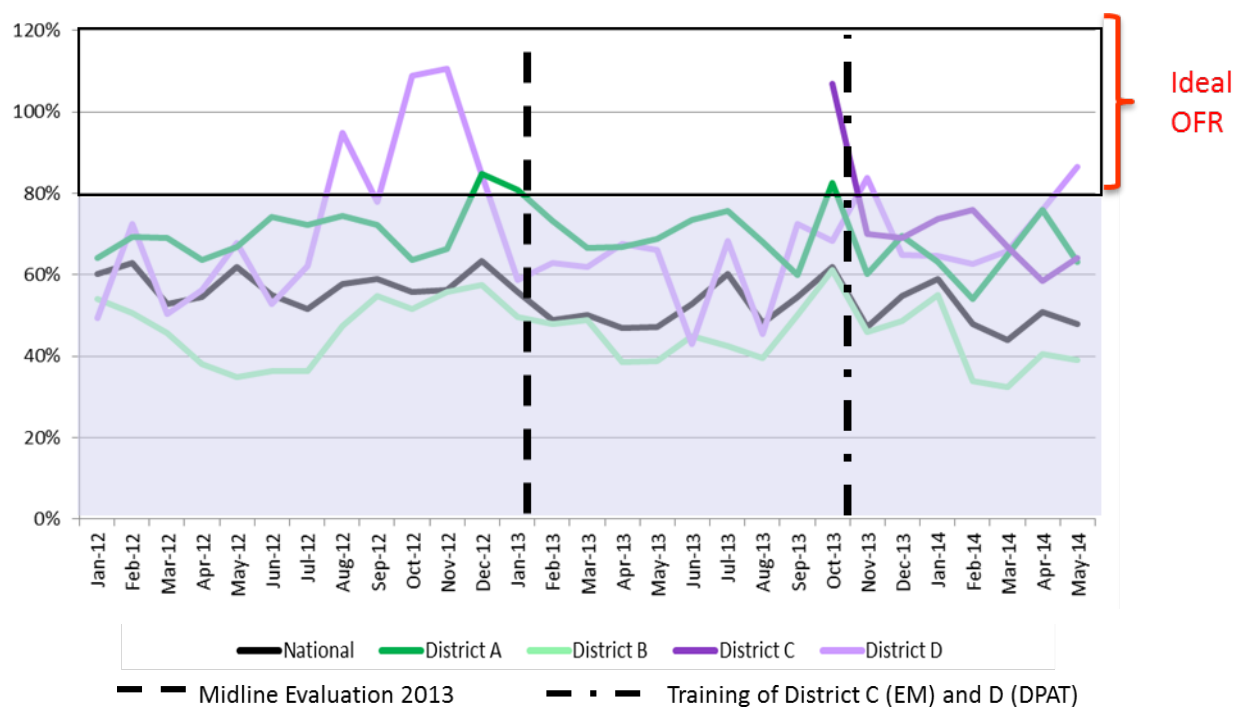
Table 12: Average OFR for Original EM Districts, Before and After Midline

Original Intervention District	Before Midline (Jan 2012 to Dec 2012)	After Midline (Jan 2013 to May 2014)
District A	70%	69%
District B	47%	45%

Table 13: Average OFR for Scale Up Districts, Before and After Training

New Scale Up Districts	Before Training (April 2013 to Sept 2013)	After Training (Oct 2013 to May 2014)
District C (EM)	N/A	73%
District D (DPAT)	60%	72%

The case study findings support the quantitative findings that HFs are not supplying HSAs as per the cStock request quantity, with HF staff reporting that they do **not use cStock exclusively** to determine resupply, but consider other factors and sources of information as well. The most common other source is the availability of stock at the HF level. About half of the HFs said they sometimes also refer to paper-based reports to check the HSA stock on hand or the number of cases seen.

Table 14: Information Used for Determining Resupply

	District A		District B		District C		District D	
	HF1	HF2	HF1	HF2	HF1	HF2	HF1	HF2
cStock	X	X	X	X	X	X	X	X
HF Stock Levels	X	X	X	X	X	X	X	X
Paper Reports	X		X	X	X	X		
Population	X							

When probed, respondents identified a variety of reasons why they do not use cStock data exclusively for determining resupply quantities: low product availability at HF, a lack of trust in how the system calculates quantities, greater comfort with using other methods of calculations (such as paper based report or using cases or population), and in one HF in the EM scale up district, a lack of trust in the data that is entered by HSAs into cStock.

Reasons for supplementing cStock Data	Supporting Quotes
Low product availability at HF	*"How do you determine how much product HSAs get?"* *"I do it according to the report and the population they have. If they don't have enough drugs, or if they have too few drugs…we had that problem before, but we have bridge now. If the pharmacy has a low stock, then they give less. If the HSAs tell me to give them more drugs that are not according to the population, I can't. cStock gives the right quantity."* HSA Supervisor, HF A1, original EM *"If cStock gives us a figure, if we don't have enough we have to reduce. We look at the cStock report and the HSA monthly report. We see the cases seen in the month and the number of drugs used, then we compare with the drugs to give. We look at the cStock message and the report. We don't give everything that*

	cStock says to resupply." HF In-Charge, HF B2, original EM
	"In our stores we see how many products we have and give HSAs as many as we can. We don't always have enough drugs to give them what they ask for." HSA Supervisor, HF D2, DPAT scale up
	"What have been the challenges of cStock and DPAT?" *"We are unable to supply HSAs as requested, that's the only big problem. It mostly gives us a good way to do things."* HSA Supervisor, HF B1, original EM
A lack of trust or understanding in how the system calculates request quantities (cStock should top up to the maximum stock level of two months of stock)	*"… cStock is supposed to give I think a three month supply to HSAs, but it sometimes over or underestimates this number…Yes, the three month supply is fine. I'm talking about the **mistakes cStock makes at times**, where it over or underestimates this quantity."* IMCI Coordinator, District A, original EM *"You mentioned earlier that sometimes cStock tells you to give a smaller amount than what the HSAs need. Does this happen often?"* *"Yes, it happens. There is one HSA—when he comes to get supplies, all of his supplies together would fill this box* [pointing to a small box on the table]. *He complains. It happens the other way around too. cStock would tell us to give 3,000 tablets of cotri to one HSA. We think this is more than enough, so we give the HSA less than that amount because we know the community that he works in. **We don't know if this is a problem with cStock or with the HSAs."** HF In-Charge, HF D1, DPAT scale up
Greater comfort with using other more traditional methods of calculations (e.g. paper based reports, cases, population)	*"We first use the cStock information. But when we look at the paper-based report, we'll see that the HSA has enough cotri, even though cStock tells us to give him a lot more cotri. **We decide what to give based on the paper-based SOH."** HSA Supervisor, HF B2, original EM *"I refer to information that comes. I use the cStock report monthly and then I give them. For example if 20 tablets are requested and I see that the HSA already has some products, first I give them 10 tablets and tell them to finish them first, then I will give them the rest…we use cStock and then the paper-based report."* HSA Supervisor, HF C1, EM scale up
Mistrust in HSA reporting the correct information (District C only)	*"How do you calculate how much to give them?"* *"Yes, we do calculate. Especially, my colleague, the supervisor, is the one who looks and says 'no, you have a lot of products.' Sometime back, the **HSAs were cooking information**…..Cooking information? … Yes. For example, an HSA would have 100 tablets but would want to get more so he would put that he has 0 products. But now, with supervision, this isn't happening anymore."* HF In-Charge, HF C1, EM scale up

In further exploring the mistrust in the cStock request quantities, Table 14 compares the perception among HF staff on whether cStock over or under estimates resupply quantities and compares this with the observations made of the RSW on what was actually resupplied and whether HFs were under or over supplying. It should be noted that HF staff and HSAs were not asked specifically if they felt cStock over or under estimated resupply quantities; however because respondents independently raised this as an issue in the course of the interviews, the perception of miscalculation may be more wide spread than these results show.

Table 15: Perception of cStock Over or Underestimating Resupply Quantities Compared to Observation of Filling Rates on RSW

	District A		District B		District C		District D	
	HF 1	**HF 2**	**HF 1**	**HF 2**	**HF 1**	**HF 2**	**HF 1**	**HF 2**
Perception of cStock over or under-estimating resupply quantities								
HSA Supervisor		U		U/O	O		U	
HF In-Charge			U/O		O		U/O	
Cluster Supervisor					O			
RSW Observation								
Under filled	Not observed	0	8	5	3			Nothing recorded
Correctly filled		6	0	2	1	4	1	
Over filled		1	1	1	3			

 U = Underestimated, O = Overestimated

This table demonstrates the mixed perception on whether cStock is over or underestimating resupply quantities. For some HF staff this does not happen all the time, but only happened once or twice where others felt it was a more regular occurrence. The table also shows that there is variation in what is supplied compared to what was requested, often HFs supply less than cStock requests, which is consistent with the quantitative data and possibly due to low availability of products at HF or because they think that cStock has overestimated the resupply quantity. Availability of products at the HF will be discussed in more detail in the product availability section.

In one HF, when products are in short supply HF staff discuss with HSAs and decide how much each HSA should receive based on what they have available.

> *So we call all the HSAs, we tell them, 'look, we only have this many products' and we decide how to resupply them based on the quantities we have available. Because you see, I have 13 village clinics. We discuss with the HSAs, say to one, 'you have enough to last you a month' and we say to another, 'you get more 'cause you don't have enough.' This is the system we've come up with. But we are supposed to prepack the products for the HSAs if we have enough stock."* HF In-charge, HF B1, original EM

The case study findings highlight that the actual process individual HF staff have taken to determine the quantity of CCM product to give each HSA is essentially non-standard, despite consistent knowledge of the resupply SOP, ability to demonstrate skills in following the resupply SOPs, and consistent use of a standard system developed for HSA resupply, cStock. The primary reasons given by these staff for deviating from what they recognize as the recommended resupply process are related to insufficient quantities at the HF. When HFs do not have the product quantities sufficient to resupply HSAs as they request, cStock does not help them to determine what to do, so they rely on their own experience and other sources of information to make adaptations.

Prepacking by Health Facility Staff

All HF in the endline evaluation except one **reported prepacking orders for HSAs as a standard practice**, and the one HF that did not prepack stated the reason was because they do not have sufficient supplies and must ration between the HSAs.

> *"After getting a message, I document the information in this one [pointing to the notebook that had the RSWs]. Then, we coordinate with the In-Charge to prepack the drugs, then I respond to the orders so that the HSAs can come collect the supplies."* HSA Supervisor, HF B2, original EM
>
> *"We're supposed to pack the products before the HSA comes… [Brief interruption while interviewee takes a phone call] …..the problem is that, we can't prepack before the HSA arrives because sometimes the drugs are in short supply at the HF. So we call all the HSAs, we tell them, 'look, we only have this many products' and we decide how to resupply them based on the quantities we have available."* HF In-Charge HF B1, original EM

When HF staff pre-pack HSA orders, the amount of time an HSA needs to spend at the HF is reduced; prepacking is an expected practice according to the SOP. Prepacking is possible as the HF receives HSA request quantities from cStock as soon as HSAs send their stock on hand data.

As designed, the HSA Supervisor and the HF In-Charge, who is the Drug Store In-Charge, work together to prepack the orders. In HFs with Pharmacy Assistants (PA), the HSA Supervisor works with the PA to prepack the orders. In these cases, the HF In-Charge has less involvement in the process and may not be as aware of the supply situation. However, PAs have often not been trained in cStock and efforts may need to be taken to include PAs in training or HPAT meetings if they are to play this role.

> *"Who packs the medicines for HSAs?"*
> *"The pharmacy assistant and I do this. If I am not here, he packs it."* HSA Supervisor, HF A1, original EM
>
> *"When you prepare the orders and pack the drugs, who do you work with?"*
> *"I have a pharmacy assistant who works with me."* HSA Supervisor, HF C1, EM scale up

There can be some obstacles to prepacking orders, including lack of coordination between the HF In-Charge and the HSA Supervisor, lack of product to fill the order (as previously mentioned), and delays in the HSAs picking up the order which can result in the products being used up. These obstacles have the potential to discourage the continued practice of prepackaging.

Lead times

The lead time is the time it takes between the HSA requesting products and then receiving the products: in cStock this is called the total lead time. The shorter the lead time, the more responsive the supply chain. For most HPATs, this was one of the indicators that was monitored to try and improve the responsiveness of the HFs to the HSAs and to encourage HSAs to collect their products promptly.

Figure 9 shows the total lead times comparing the case study districts with the national picture. In looking at total lead time, it appears that national lead times have been sustained, and even reduced, as EM has scaled up to more districts. In the original districts, lead times stayed the same in one district (A) and reduced in the other (B). For District D there was a reduction in lead times following the introduction of DPATs. For District C lead times reduced after the DPAT cluster review meetings in March.

Figure 9: Average Lead Time (Time Between Request and Receipt)
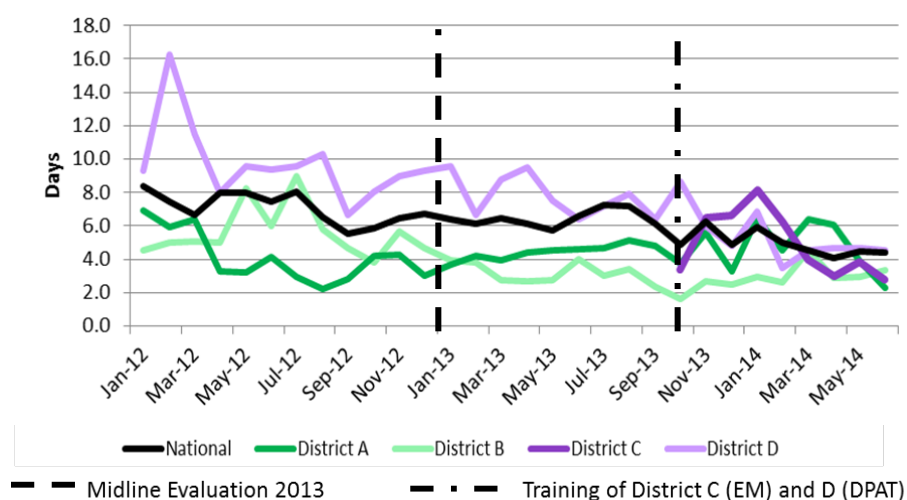
Table 16: Average Lead Time (Time between Request and Receipt)

Original Intervention District	Before Midline (Jan 2012 to Dec 2012)	After Midline (Jan 2013 to May 2014)	Scale Up Districts	Before Training (April 2013 to Sept 2013)	After Training (Oct 2013 to May 2014)
District A	4.1	4.6	**District C (EM)**	N/A	4.9
District B	5.6	3.0	**District D (DPAT)**	6.5	**4.9**

Lead time can also be broken down further to provide a better picture of factors contributing to performance. First, cStock displays how long it takes between the HSA sending the SOH report and the HF sending a response, called "order to order ready", and second, cStock displays the time it takes between the "order ready" message and when the HSA collects the products, "order ready to receipt". By getting this detail the main cause of long lead times can be identified, whether it is the HF staff or HSA, or the result of both parties' actions.

Districts B and D showed improvements in both the time it takes for the HF to respond to a request (order to order ready), and in the time it takes a HSA to respond to an order ready message and send a receipt (order ready to receipt). District C was in line with the national average.

Figure 10: Average Time Between Order to Order Ready
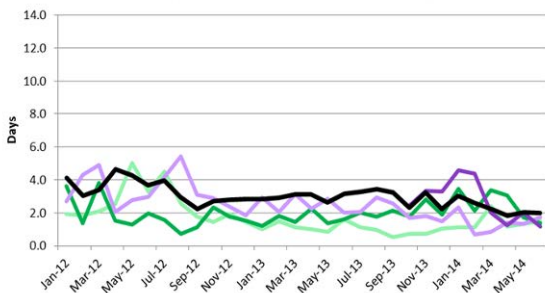
Figure 11: Average Time Between Order Ready to Receipt
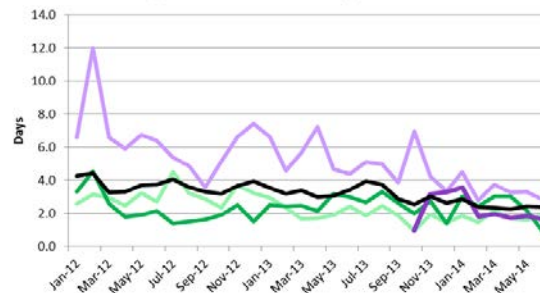
Table 17: Average Lead Times Before and After Midline for Original EM Districts and Before and After Training for Scale Up Districts

	Average Order to Order Ready (days)		Average Order Ready to Receipt (days)	
Original EM Districts	Before Midline	After Midline	Before Midline	After Midline
District A	1.9	2.1	2.2	2.5
District B	2.5	**1.2**	3.1	**1.9**
Scale Up Districts	Before Training	After Training	Before Training	After Training
District C (EM)	N/A	2.7	N/A	2.2
District D (DPAT)	2.5	**1.5**	5.0	**3.9**

Benefits of the cStock Reporting and Resupply Process

HSAs and HF staff say that cStock has provided a **simple process for them to request and resupply products in a systematic way.** Users recognize the benefit of the standard cStock process for reporting, resupply and handling of low stock levels and stockouts, and the benefit of improved information on product availability provided by cStock. Staff understand and take advantage of the use of the EO process as part of the system.

Common benefits of cStock in easing the process of resupply cited by HSAs include ease of reporting and time saved because they come to the HF after they are notified that their products are available for pick-up. Many HF staff members acknowledged cStock's role in reducing their workload at the HF since more children are receiving treatment in their communities. In addition, the cStock flow of information has improved communication and fostered closer relationships and transparency between HSAs and HF staff, improving the overall coordination for resupply.

Benefit	Key Quotations
Ease of reporting	*"cStock has eased our jobs. Some problems have been tackled such as the ordering of products. Everyone is enjoying this system; it doesn't take much time you can just use your phone from your home to report. It is a smart and easy system."* HSA Supervisor, HF D2, DPAT scale up

	"...it has also reduced workload by simplifying the reporting system." HSA A1.1, original EM
Reminders for reporting	*"Now the system assisted me in timely delivery of reports. The system also has reminders which remind us on reporting issues. Mostly, when I forget to report or I am about to report."* HSA A2.1, original EM
	"How has cStock affected the work that you do?" *"It has not affected us in anyway if anything it has assisted us a lot because it reminds us to be sending reports on time and quickly."* HSA, HF D1, DPAT scale up
Reduced Travel Burden	*"It has reduced HSA's travel to the health centre; in the past I used to come without any planned purpose to the health centre but now I usually come when there is something, for example like to get drugs"* HSA, B1.2, original EM
	"It has really helped us because at first, HSAs had to come get drugs and sometimes they'd get here and find that we didn't have drugs to give them. So it was tiresome for them because some of them live far from here. But with cStock, they come only after we send them a message that their order is ready." HF In-Charge, HF D1, DPAT scale up
	"As I explained earlier, cStock has reduced travel burden, in the past we were going to the facility and come back without the products. It has also reduced period to collect products to 4 days." HSA, A1.2, original EM
	"Before, HSAs were coming to the HF without any notice only to be told that we didn't have drugs to give them. But with cStock, they know when to come and when to not come." HF In-Charge, HF D1, DPAT scale up
Eases calculation of resupply	*"Our work is reduced because cStock gives us the exact amount to supply."* HF In-Charge, HF D2, DPAT scale up
	"Now, we don't have any problems in saying how much product we'll give because cStock tells us how much to supply." HF In charge, HF C1, EM scale up
Ability to report low stocks	*"Drug availability has improved a lot because when supplies are about to run out we send an emergency order"* HSA, B1.2, original EM
	"cStock is helping me not to have stockouts of products because when I reach the emergency order point I send my emergency order so that products are not scarce and the community that I serve does not go back at times because I don't have products in stock. In the past, the community could stay for some time without products" HSA, C2.2, EM scale up
Improved communication and relationships	*"cStock is a good system. It has improved communication. Now am able to send reports (messages) from anywhere. It is faster. It takes 30 seconds to send and receive feedback."* HSA, HF D2, DPAT scale up
	"It helps with communication. It makes it easier to reach the person responsible to do a particular duty. Before cStock it was difficult to send a message, like messages to order drugs." Cluster Supervisor, HF A1, original EM
Improved	*"cStock has improved our relationship because we can sit together and look at*

| relationships and transparency | *the data. They know why I'm giving them that quantity. There's transparency and accountability. And the involvement of HSAs has assisted me, because they're also treating patients, not just me. So my workload has been reduced."* In-charge, HF B1, original EM |

Challenges with cStock and the Resupply Process

While use of cStock for reporting has been consistent across both original EM and scale up districts since it was introduced, there are some challenges that have the potential to affect the use of cStock in the long run, and as previously discussed have already altered the use of cStock from how it was designed, specifically in the calculation of resupply quantities for HSAs.

As previously mentioned, there is some mistrust in the request quantities that cStock calculates for individual HSAs. The table below contains the perception of both HF staff and HSAs as to whether cStock over or under estimates (HF data was also presented above in Table 14).

Table 18: Perception of cStock Over or Underestimating Request Quantities

	District A		District B		District C		District D	
	HF 1	**HF 2**	**HF 1**	**HF 2**	**HF 1**	**HF 2**	**HF 1**	**HF 2**
HSA Supervisor		U		U/O	O		U	
HF In-Charge			U/O		O		U/O	
Cluster Supervisor					O			
HSA 1		U	U/O	U/O	U/O	U/O		U
HSA 2	U	U/O	U					

U = underestimated, O = overestimated

However for many HF staff this perception of cStock incorrectly calculating resupply quantities was not for all requests, but limited to particular HSAs or products, and was based on just a few incidents. Also there was some misunderstanding on how cStock calculates resupply with some believing cStock tops up to three months' supply; for Malawi the standard procedures for resupply at HSA level is to top up to two months' supply each month as this is adequate to cover both lead time and buffer stock.

This issue needs further exploration to determine if cStock is calculating incorrectly, and if so, the cause of the over/under estimation. Are data entry errors by the users problematic or is there a system error? This exploration is important for building HF staff confidence in cStock request quantities so that the resupply process can be standardized and aligned according to supply chain best practices, and to reduce the calculation burden on HF staff (as cStock was designed to do).

Some other reported challenges are more related to infrastructure problems with the cStock system, such as inadequate mobile phone network coverage, limited access to electricity to charge mobile phones and system errors resulting in messages being rejected. Many HSAs also referred to a particular incident that occurred earlier in 2014 when an upgrade to cStock affected the ability of many HSAs to send their SOH reports; this issue was resolved within 24 hours, but demonstrates the affect such an incident can have on discouraging their use of the system.

	Key Quotations
Network Coverage	*"…Sometimes network is a problem like where I come from network is a problem so I have to search for network to be able to send the report."* HSA, A1.1, original EM *"If there is a network problem because you have stayed there for some time you try to search for network to be able to send the message"* HSA C2.2, EM scale up *"For our friends in the mountains, it's difficult for them to receive the ready message from cStock. For example, we have a friend in a very hard to reach area. So what do you do in his case? He came here early, on the 31st and sent the cStock report."* HSA Supervisor, HF A2, original EM
Access to electricity	*"Charging of my phone because there is no electricity where I live. Secondly when you want to use somebody's phone when your phone is not working it is difficult since we live at a distance to each other"* HSA, C2.1, EM scale up *"We use phones to report, but when there is no electricity at the facility, our reports don't go through".* HSA, B1.1, original EM *"The only challenge that I can mention is that I stay in a remote area where there is no electricity and sometimes there it rains for a week or so and I am forced to find means of charging the phone. I sometimes use other people's solar panels or I have to travel to Chintheche just to get the phone charge to make sure that I send the report on time."* HSA, D1, DPAT scale up
Connection problems	*"He said that two days prior to the meeting he tried to send SOH but the message could not get through and he even showed the Senior HSA the message that he was trying to send while at home. So the Senior HSA communicated with the IMCI Coordinator who said that it was not only him that was facing that problem but there were couple of HSAs that were facing the same problem."* HSA, HF D1, DPAT scale up *"When HSAs are sending messages, sometimes it doesn't work, the message doesn't go through. We don't know how the system works. This only happened at one time. The HSA was supposed to supply information on the amount received, and was trying to do this on cStock and it failed. He tried and tried and eventually it worked."* HSA Supervisor, HF D1, DPAT scale up *<u>"Just to follow up when you failed to send the emergency order how many times did you try?"</u>* *"I tried for three times then on the fourth attempt I sent SOH and it went through."* *<u>"Did you report this?"</u>* *"I called the senior HSA and that time I was with a friend who was also experiencing a similar problem and the senior HSA responded that the problem was with the system. He also said that he had received similar complaints from some HSAs."* HSA, B1.2, original EM

| 2014 System Upgrade | *"Like the other time I sent SOH, the reply I got from cStock was 'your order was too much'. When I presented my problem to him, he advised to send SOH again but with less quantities. When I did, my message went through."* HSA, D2, DPAT scale up |
| | *".... our reports don't go through. e.g., when I send EO the reply I get is sorry, 'your order is too much'."* HSA, B1.1, original EM |

Summary

HSAs and HF staff say that **cStock has provided a simple process for them to request and resupply** products in a systematic way. With cStock, HSAs know and are reminded to report on their products every month and they know to send EOs when stocks are low within the month. Upon receiving cStock requests, the HF staff use the RSW to record information from the cStock message and send 'order ready' message when products are ready for pick-up.

> *"How has cStock changed supply process to HSAs?"*
> *"We were just giving them products anyhow. cStock is like a guide. It tells you a, b, c, d..."*
> *"Ya, in the sense that it acts like a guide to us. In the past, there was no system. We were doing things blindly. For my colleagues too, it's a guide."* HF In-Charge, HF C1, EM scale up

HSAs use the reporting procedures as designed and report to cStock routinely. HFs prepack orders as a standard practice and notify HSAs when the order is ready. However, the quantities of products resupplied to HSA are sometimes not based solely on the cStock recommended quantities, as was intended in the original design. Users of cStock could identify many benefits of the system and generally were very enthusiastic about the system. However, a number of challenges do need to be managed to ensure users continue to have confidence in the system.

Key Findings: Product Availability Teams

The findings in this section draw primarily from the case study data, as cStock does not include indicators on the functioning of the DPAT. Case study data on HPATs and DPATs include in-depth interviews with members and review of the previous three entries in the management diary.

Health Facility Product Availability Teams (HPAT)

HPAT Meetings

Review of the entries in the HPAT management diaries showed that meetings **were taking place in majority of HFs**. In one original district HF, HPATs had stopped in 2013 because of a staff change, and the management diary was not found in the other HF in that district (Table 18). **Aligning the meeting with product collection or a specified day of the month does seem to result in more consistent meetings.**

"I think, on cStock, because we combined them—the HPAT meeting and the HSAs coming to collect supplies, I think time has been minimized. It has even reduced our workload because HSAs come on one day and we assist them." HSA Supervisor, HF B2, original EM

Table 19: HPAT Meetings Conducted in 2014

	Original				Scale Up			
	District A		District B		District C		District D	
	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2
Reported Frequency*	Monthly	No meetings since 2013	Monthly	Monthly	Monthly	Monthly	Monthly, no meeting since Feb	Monthly
Timing of meeting*	2nd of the month	N/A	Aligned with product collection	Aligned with product collection	Agree on date of next at each meeting	Combined with general staff meeting	Aligned with product collection	Aligned with product collection
HPAT Meetings in 2014**	No diary to observe***	0	3	4	1	2	2	5

* Based on interview   ** Based on observation of management diary
***The management diary was not available; the HSA Supervisor had been on medical leave for one month and returned to participate in interview

In the one HF that had held all their six HPATs prior to 2014 (District A, HF 2), the interruption was explained by the HSAs attached to that HF as a result of the HF In-Charge who had been trained in HPAT leaving, and the new In-Charge having recently received training, but having not yet initiated the meetings. They further attributed the newly trained HF In-Charge's lack of initiative on re-starting the HPAT to a **lack of district attention and follow-up.** This experience shows how staff turnover can

undermine sustaining HPATs, even in environments where they had been occurring for a relatively long period (2011-2013) and seemed to have become routine.

> *"Do you have regular meetings with the health centre about the products you manage, sometimes called a HPAT or DPAT meeting?"*
> *"Yes they happen...let me be honest and not make any unnecessary additions. In the past, they used to happen but of late they are not happening just because the In-Charge whom we used to have has gone to school and the one we have now has just been trained and he is yet to initiate the process again".*
> *"When was the last time that you had the meeting?"*
> *"It was early this year if not towards the end of last year."* HSA, A2.2, original EM
>
> *"Why are you not having these [HPAT] meetings now?"*
> *"I think people from the district are lacking seriousness, of late they are not even asking us why we are not meeting. On HPAT/DPAT, people from district should show seriousness on the program. Now they seem relaxed, they do not care whether health centers meet or not."* HSA, A2.1, original EM

The importance of district follow-up and attention was reinforced by the example listed below, where motivation by the district level was found to have helped them restart HPATs after a long hiatus.

> From review of the management diary in HF1, District B, original EM
>
> Prior to January 2014, there wasn't a DPAT meeting since August 15, 2013. In 2013, the meetings were sparse with documentation for the months of January, March, May, June and August. Reviewer probe with HF staff:
>
> *"Why did you stop having DPAT meetings between September and December 2013?"*
> *"This happened when one of the medical assistants stopped having interest in the meetings and stopped coming."*
> *"Why did you start having the meetings again starting January 2014?"*
> *"We started having them again because a supervisor came from the district to help on general matters at the HF and because we [all HF staff] were all together we decided that we should resume having the meetings."*

In one scale up district (D), motivation to continue the HPATs at one HF (HF 1) has dwindled after two meetings because there is a feeling that the district is not responding to the HPAT requests that they have identified would help solve product availability problems. The HPAT identified many issues that are not specific to cStock or CCM products, but that the HSAs see as important for the resupply process: bicycle repairs, new bags for carrying supplies, raingear and boots – as well as things that are not related to resupply, but to the HSAs' CCM work: IMCI equipment and tables and chairs for the clinic. The district does not have a budget to provide these which has resulted in the HSAs and HF feeling that the district is not responsive and that the HPAT meeting is not worthwhile unless the issues they have already identified are resolved.

> **Perceived lack of responsiveness from district – example from District D**
>
> *"However the main challenge is that we don't get feedback from the DHO about the problems that we present so it is like at HPAT we are always discussing the same issue. And I should be honest with you that since we started having HPAT meetings and presented our issue to DPAT, we have never received any feedback from the district."*
>
> HSA 1, HF D1, DPAT scale up
>
> *"We were trying to link with the [D] district in conjunction with issues faced and challenges, but there has not been any response. Since the same issues occur again and again and our challenges are never handled we decide not to meet after February. The HSAs have insisted that we meet with the DHO to fix the challenges which the HSAs have met again and again."*
>
> Challenges that were identified are: *"Utensils for IMCI are broken, push bikes are off the road, a lack of raincoats and boots during rainy season, no chairs or tables for the village clinic."* HSA Supervisor, HF D1, DPAT scale up

Performance Monitoring by HPAT

Performance monitoring at HF level was typically conducted around the meetings. All HFs had management diaries, but none had copies of the district performance plan or recognition plan; however, many discussed DPAT indicators and gave verbal recognition during HPAT meetings. Based on observations from the management diaries, on the most part HPAT meetings focused on the recommended performance indicators: timely and complete reporting, issues related to lead time, stock on hand, EOs – different aspects of supply chain monitoring that need to occur routinely. Non-reporting and timely and complete reporting were the most frequently discussed issues in both original and scale up districts, followed by lead time and specific product stock issues. (Table 19)

Table 20: Performance Monitoring by District and Health Facility

	Original District				**Scale Up Districts**			
	District A		District B		District C		District D	
	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2	HF 1	HF 2
Document used for monitoring	No mention	Report from district	No mention	RSW	RSW	RSW	Form 1A	No mention
Performance Plan	No	No	No	No	No	No	No	No
Management Diary	Yes, not observed	Yes*	Yes	Yes	Yes	Yes	Yes	Yes
Recognition Plan	No	No	No	No	No	No	No	No
Indicators discussed during meetings**								
• **Reporting**	n/a	X	X	X	X	X	X	X

• **Lead times**	n/a	X	X		X	X	X	
• **EOs**	n/a	X		X	X			
• **Stock Issues**	n/a	X			X		X	X

*Observed management diary entries only from 2011 to August 2013 when meetings were still occurring,
**Management diaries observed from November 2013 to June 2014

Recognition

Recognition, in the form of encouragement, was also common during the meetings despite HFs not having a copy of the recognition plan. Encouragement tended to be focused on good performance, but also to encourage HSAs not performing well to improve on specific challenges, such as timely reporting or collection of products.

> *"I look at the previous minutes and see if the problems that we have are solved and if they haven't, we see who is supposed to solve it. I see if the HSAs have achieved good reports and if they have, I encourage them with my words by saying 'Thank you for improving'."* HSA supervisor, HF A1, original EM

> "We discussed how to write the monthly report form, those that send in their report late; on cStock we encouraged each other to be sending in reports on time. We also encouraged those that come late to collect their products after cStock sends you the message to collect the products." HSA, B2.1, original EM

> *"Do your HFs have a recognition plan?"*
> *"Yes. We discourage giving money as a gift because it is not sustainable. However, during the meetings we should recognize the work HSAs do so we clap for them."* Cluster Supervisor, HC C2, EM scale up

> *"We appreciated the HSAs and the HF staff for their cooperation since starting the HPATs, on their improvement on lead time and their timely assistance."* HSA Supervisor, HC D1, DPAT scale up

Benefits of HPAT

Respondents at both HSA and HF levels identified a range of benefits of HPAT meetings, even in HFs that had stopped holding HPATs more than a year before (one HF in District A, original EM) and that were already somewhat disenchanted after only a few initial meetings (District D). Many of these benefits reached beyond CCM product availability and resupply issues, and all were related to **improved communication, coordination, and collaboration** between the HF and HSAs. HFs and HSAs, although using different terms, identified an improved sense of "team spirit" as one of the important benefits of HPAT meetings. Other benefits identified by case study respondents at the HF level included time saving, better sense of responsibility and roles, and greater enjoyment of their job.

Perceived Benefit	Key Quotations
Enables collective problem-solving	*"With HPAT meetings I am now able to ask friends if I have problems"* HSA, A1.2, original EM
Facilitates better performance	*"You correct the mistakes that you were making be it reporting late or coming late to collect products when advised to do so."* HSA, B1.2, original EM
Enables knowledge and experience sharing	*"A lot because it has improved the way I am working considering that there are times where I am able to meet and share experience with colleagues."* HSA, C2.2, EM scale up
Allows encouragement and motivation of one another	*"We encourage each other to work harder on cStock. e.g. telling each other the importance of sending our different reports at the right time."* HSA, D2, DPAT scale up
Fosters team spirit to solve problems	*"We are now working as a team - now we are able to solve problems."* HSA C1.1, EM scale up
Increased coordination and collaboration	*"....but now we are meeting frequently and there is coordination among us..."* HSA, C1.2, EM scale up

HSAs in original districts identified the HPAT as a chance to share knowledge and connect with their colleagues, or "friends", and collectively solve problems, and HF staff noted that the meetings were action-oriented and brought people together.

"With HPAT meetings I am now able to ask friends if I have problems" HSA, A1.2, original EM

"Problems are solved through the help of friends (I learn from friends)... when I have a problem, it is not solved quickly because of lack of regular meetings." HSA, B1.1, original EM

"During HPAT meetings we share with each other our weaknesses; HPAT makes you to be at par with your friends. In the past meeting we also reminded each other how to record entries in the child profile...and as a result of that meeting we are now able to fill in the village health register on the type of LA that is given to the children that we assist." HSA B2.2, original EM

In one of the scale up districts where cStock and HPAT/DPAT were introduced together in late 2013, district and HF staff and HSAs both identified that the sense of team made their work more enjoyable.

> *"We have team work at the HFs. There's good relationship between the In-Charges and the supervisors, so the village clinic supply chain issues are not compromised. Also, the District Pharmacist now appreciates the issues of supplying the community. Before, it was business as usual. With DPAT, everyone appreciates the supply chain issues. HSAs are fully supported now. Before, people were pointing fingers at them."* IMCI Coordinator, District C, EM scale up
>
> <u>*"Has cStock and DPAT made any difference in the way you like your work?"*</u>
> *"If we compare with the past we are able to see that during that time we were not meeting frequently, but now we are meeting frequently and there is coordination among us. In addition this intervention has added some knowledge to us and we have known some things that we could not have known if we were not in this program."* HSA, C1.2, EM scale up
>
> *"We are now working as a team - now we are able to solve problems."* HSA, C1.1, EM scale up
>
> *"A lot because it has improved the way I am working considering that there are times where I am able to meet and share experience with colleagues."* HSA, C2.2, EM scale up

Another benefit that was realized was that HPAT meetings provided a venue for issues beyond the logistics ones – these meetings allowed HSAs and HF staff to discuss the completion of village registers and Form 1A, update knowledge on care of children, and how to strengthen relationships with the community.

The benefits of HPAT were universally and strongly identified by all case study participants, from district to HSA, in original and scale up districts, with long, short, and interrupted experience with HPATs, indicating that the benefits are not only rapidly realized, but endure.

Challenges to HPAT

Participants at HSA and HF levels from original and scale up districts in the case study also identified a range of challenges to HPATs. Most of these related to workload and motivation barriers, such as long travel distances and long meeting times. Absence of designated HPAT members seemed to be a problem for holding the meetings that was identified mostly in the EM scale up District C, whereas lack of district engagement was identified by one HF in an original and both HFs in one scale up district.

Challenge	Key Quotation
Transportation/distance	*"HSAs stay too far away so they can come late for meetings and to collect drugs. Sometimes they have to use their own money to get here. Some HSAs have bikes, some don't."* HF In-Charge, HF B2, original EM
Length of meeting and lack of refreshments / allowances	*"No there are no problems we have bicycles but the main problem is having to spend a long time there without taking any food."* HSA, B2.2, original EM
Absence of HPAT members (HSAs and HF staff)	*"One attendance was low and another time the In-Charge was not here"* HSA Supervisor, HF C1, EM scale up
Integration of other activities (like product pick-up) in meeting	*"In June, the 1st was on a Sunday so the HSAs failed to come. Some came on Monday to get their products. Some came on Tuesday."* HSA Supervisor, HF B2, original EM

"This is because we had no products to supply HSAs with so they didn't come here." HSA Supervisors HF B1, original EM |

Lack of district engagement and feedback	*"I think people from the district are lacking seriousness, of late they are not even asking us why we are not meeting."* HSA A2.1, original EM
	"However the main challenge is that we don't get feedback from the DHO about the problems that we present so it is like at HPAT we are always discussing the same issue." HSA D1.1, DPAT scale up

There were differing perspectives on combining CCM product pick-up with the HPAT meetings. Many HF staff saw this approach as time-saving from their end, whereas others could see how it lengthened the amount of time that HSAs were required to stay at the HF.

Differing Perspectives on Having HPAT and Product Pick-Up on Same Day: One HF in Original EM District (District B)

"The meeting happens during the 1st and 2nd of the month because this is also the time where HSAs come to the HF to pick up medicines" "In-Charge calls the meeting." Cluster Supervisor, HF B2

Benefit of combination: *"I think, on cStock, because we combined them—the HPAT meeting and the HSAs coming to collect supplies, I think time has been minimized. It has even reduced our workload because HSAs come on one day and we assist them. Time is saved."* HSA Supervisor, HF B2

Meeting attached to product collection: *"The same day we go to collect products from the Health Center"* Last meeting was *"first of May 2014." "We agreed that we should be meeting on the first day of the month."* HSA B2.2

"It is time consuming. HPAT meeting take too long to finish. We send REC to cStock on all the products that we have collected then hold HPAT meetings. There are too many issues on the agenda to be discussed. At times we go as far as 2 PM. I wish we could hold HPAT meetings on a separate day, not on the day we go to collect the products but we are doing fine on cStock." HSA B2.1

Lack of allowances and refreshments provided during meetings, or other compensation or incentives, reinforced the problem of long distances and difficult travel conditions as a perceived challenge to HPAT, while integrating product pick-up with HPAT meetings was often cited as contributing to long meeting times. The combination of long meeting times and long distances was a real barrier for HSAs, and was identified by HF staff as well as HSAs in both the original pilot and scale up districts, even though HPAT meetings had been held in 2014 in all but one HF in the original district, where HPATs had not been held in more than a year.

Challenges with HPAT, Remembered After a 1-Year Interruption

"*What are the challenges of having HPAT meeting?"*
"No incentives, these meeting take long, at least four hours. Some have no bicycles so it is difficult to travel to and from the health center." HSA, A2.1, original EM

"Mostly there are no incentives and considering that the meetings take 3-4 hours we can be at the facility up to 3 or 4 PM in the afternoon." HSA, A2.2, original EM

"We stay here over lunch hours but there are no allowances." HSA Supervisor, HF A2, original EM

Although these HPAT challenges were clearly expressed to the case study team nearly universally, the responses must also be balanced with the fact that most HSAs still had attended the HPAT meetings that had occurred. Usually this was because HPAT attendance was part of their overall performance review, and HF staff worked to encourage their performance, including attending the HPAT meetings.

District Product Availability Teams (DPAT)

DPAT Meetings

In the four districts visited by the case study team, **a total of six of the expected eight DPAT meetings** had occurred between January to June 2014 (time of data collection) based on observations of the management diaries and interview responses. However, none of those six DPAT meetings were structured as designed with attendance varying from only district based staff (no CSs) to including all members of the DPAT from HSAs to district staff. Only two of the four districts conducted regular DPAT district level meetings, the other two districts relied on partner supported review meetings held at cluster level, which are heavily dependent on funding and are not a true substitute for DPATs as they address cluster issues only and do not consider the issues for the whole district.

Table 21: DPAT Meetings Held in 2014, Case Study Districts

	Original		Scale Up	
	District A	District B	District C	District D
DPAT Meetings Conducted in 2014*	0	1	0	2
Attendance at DPAT Meetings	N/A	District Staff	N/A	District Staff
Partner funded DPAT review meeting in 2014	1**	1**	1	N/A
Attendance at DPAT Meetings	District, Cluster Supervisor, HF Staff, HSAs	District, HF Staff, HSAs	DHMT, HF Staff	N/A

*Based on observation of management diary   **Based on interview responses: both held at cluster level

In District A, review meetings in 2012 were funded by WHO and UNICEF, which were considered DPAT meetings, included district and HF staff and HSAs, and were held in clusters. No meetings were held in 2013. The most recent DPAT/review meeting was held in May 2014, again funded by a partner and held at the cluster level to make it more resource efficient. These review meetings covered a range of topics, not just DPAT issues. District staff explained that it was necessary to integrate DPAT issues into other meetings as it was difficult to have standalone meetings. In addition, in 2012 District A held two district staff only DPAT meetings, which were reported as effective in resolving issues and advocating for drug procurement.

> *"Is the district having DPAT meetings?"*
> *"They are not happening because of financial problems… because you see we have to call people from the HFs to attend the meetings."*
> *"Do you ever have DPAT meetings with just district staff, without calling staff from HFs?"*
> *"DPAT meetings involve the district and HF staff. This year, we haven't had any DPAT meetings. Last year, we had a meeting with the support of UNICEF. No, sorry, I've given you the wrong information. We've decided that maybe we, the district staff, can travel to the individual clusters and hold DPAT meetings for each of them. We've been doing that every quarter."* IMCI Coordinator, District A, original EM
>
> *"Is there any difference between review and DPAT?"*
> *"I'm not sure what they called it. Even at the HF, we integrate the issues because it's hard to have a DPAT meeting by itself."* Deputy IMCI Coordinator, District A, original EM

In District B, it was reported that the district level staff meets formally every quarter and informally at other times. The case study team observed that in 2014 only one of these district level meetings had been held by the time of the interview in June. However, in January and February 2014, review meetings funded by WHO were held with staff from all levels to address issues identified in the DPAT meeting from October 2013 – refreshing staff on cStock use, product availability, and training of 72 HSAs now providing CCM. The next DPAT meeting was scheduled for July 2014.

> *"Formally we meet quarterly but if we meet in the corridors we usually share experiences and make decisions like calling the health facilities where there is a problem. We have a problem of documenting* [informal meetings] *but when we meet formally we document."* IMCI Coordinator, District B, original EM

In District C, the only meeting reported as DPAT was actually a review meeting, which also was supported by a partner. A review of the management diary showed that product availability and cStock reporting status was reviewed during the meeting, as it would have been done during a DPAT.

> *"Do you have a plan to resolve the lack of resources for the DPAT?"*
> *"We look to the* [partner] *for that. We are trying to discuss it but we haven't yet found a solution."* IMCI Coordinator, District C, EM scale up

In District D, two DPAT meetings had been held since November 2013 – the only district to have held more than one DPAT in 2014. Both meetings focused on supply chain performance review. There is no partner in this district, so there are no district review meetings – therefore, there also is no expectation for partner support for meetings, and no confusion or blending of DPAT topics and objectives with those of review meetings.

> *"How often do you have DPAT meetings?"*
> *"Every three months"*
> *"Are there any incentives given to attend these meetings?"*
> *" No there aren't, but it is referred to the DHO."* IMCI Coordinator, District D, DPAT scale up

Partner supported district-level review meeting appear to be a confounding factor to the DPAT meetings. Three of the four case study districts had review meetings that were supported by partners, and in all, the

mixture of partner support for review meetings and DPATs resulted in a somewhat mixed commitment to holding stand-alone DPATs.

Performance Monitoring by DPAT

A central, critical function of district level DPAT members is to monitor performance on supply chain, using data and indicators, which inform whether performance is improving, where there are important gaps, and where actions need to be taken. It should be noted that it is not expected that CSs access and monitor the dashboard as many of them sit at a HF and do not have regular access to a computer or internet. The DPAT meetings are one mechanism through which performance monitoring happens. As we have seen, the meetings are critical for team-building, joint problem-solving, data sharing, and improving transparency and a shared sense of accountability for CCM products at the community level. However, the DPATs are not just about meetings – because of cStock, data can be continuously and individually monitored using the dashboard that is enabled by cStock's mobile platform.

In all case study districts, the **cStock dashboard was identified as the key mechanism that enabled performance monitoring for supply chain at the district level**, even by those who do not use it regularly. The dashboard data facilitated the transparent and objective comparison of performance among facilities and districts, but some form of communication was needed to turn that data comparison into motivation, encouragement and actions for follow up – this was usually done through meetings, but sometimes using mobile phones – text messages or phone calls. Access to the dashboard data, however, was the critical first step to motivate performance monitoring and support to improve performance.

All four IMCI Coordinators and two District Pharmacy Technicians said **they access the dashboard to monitor performance**; frequency of use varied from daily to weekly to monthly. Our case study team observed their use of the dashboard, and while there were some gaps, IMCI Coordinators were able to navigate the dashboard.

> *"I look at it at every month end. The last time I used it was in end of May."* IMCI Coordinator, District C, EM scale up
>
> *"How often do you use the dashboard?"*
> *"Every day. It's a part of me."* District Pharmacy Technician, District B, original EM

The data from cStock is used in a number of ways. In some districts cStock data about HF performance from the dashboard was shared at DPAT and review meetings, and served as the platform for discussing performance problems and recognizing good performance. In some districts the data is printed from cStock or used to create reports (sometimes for the clusters), or the dashboard is projected during the meeting so that performance can be compared across facilities, weak HFs identified and plans made to address the challenges.

"The [IMCI] *Coordinator goes on the dashboard and sees problems. He makes print out of reports, sends them to HFs and HSAs, then sets a date, and then meets with the HSAs."* Pharmacy Technician, District A, original EM

"How do you set the agenda for the meeting?"
"It is taken from cStock dashboard to see HSAs reporting rate, order fill rate, lead time, health facility reporting; but also information from paper based. We use the information for comparison here is where you compare four columns that have to be the same when you look at cStock and paper based." IMCI Coordinator, District B, original EM

"I decided the agenda based on what is on the dashboard. We had low reporting of HSAs. This was because most HFs have run out of supplies so the HSAs were not running the clinic. The HSAs need to be pushed to report regardless of if the clinic is run or not. These issues were discussed." IMCI Coordinator, District C, EM scale up

"How do you decide the agenda for the meeting?"
"The Pharmacy Technician, who is also the chair, and I look at the reports and isolate issues that need to be discussed." IMCI Coordinator, District D, DPAT scale up

The cStock dashboard is not only used for monitoring performance during DPAT or review meetings, some district staff monitor the dashboard regardless of whether there is a meeting and **follow up on issues by phone or through targeted supervision.** Sometimes district staff access the dashboard in response to an alert received on their phone, while others actively accessed the dashboard on a regular basis.

"What are the benefits of cStock? We can also plan for targeted supervision and go to support those who need support." IMCI Coordinator, District A, original EM

"I receive alerts on my phone and then I go to look on the dashboard. I get alerts like percent of HSAs that have not reported so I call specific HSAs to ask why they are not reporting." IMCI Coordinator, District B, original EM

"What have been the benefits of DPAT, if any?"
"When you do a review, data will be there for the facility...about reporting, non-reporting, challenges, how to move forward and what course of action has to be taken. And if it's all going well, then you just continue." Zonal Supervisor, District C, EM scale up

"Even if I can't go to the HFs, I can provide remote supervision to see what is happening at the HFs and HSAs. I can interact via phone. It also helps us monitor our problems." IMCI Coordinator, District D, DPAT scale up

Recognition

Recognition of good performance and keeping track of a facility's or district's standing, as compared with others, was typically identified by HSAs, HF and district staff as a motivator for continuous monitoring and improvement. Recognition was reported to be part of review meetings; one district mentioned they were able to motivate by having HSAs represent them at a national level, and congratulatory text messages sent from the central level commending the top five ranked performing districts was shown to create a sense of healthy competition and motivation to do better.

Review Meetings

"In terms of congratulations and words of encouragement when HSAs are doing well. During the review meetings, the HSAs that are doing well are prioritized and others are encouraged to do well." HF In-Charge, HF B2, original EM

Representation at National Level

"We had JSI DPAT orientation meeting so the two were recognized there. I gave them a cloth and T shirt; we have also managed to send one HAS to represent us at national level in the presence of the PS [Permanent Secretary] *from the Ministry of Health; we have also provided utensils for hygiene. These are things that do not demand too much money. We have managed to give some of them assignments like moving them from being HSAs to supervise other HSAs. I give them a motorcycle, allowances for fuel. Finally I asked one of the best performing HSAs what he wished, he said if you happen to have visitors take them here. So at one time we took UNICEF staff there - they were doing a documentary and the HSA was excited, it was like a motivation for him."* IMCI Coordinator, District B, original EM

Text Messages of Top Performing Districts

"We all went to the HPAT training. We receive some messages on our phones...quarterly I think. We get messages about districts that are doing well, like AAA and it motivates them, because they want to make it on that list." HF In-Charge, HF D1, DPAT scale up

"I think it does, sometimes I get a message from cStock that [District B] *is on first position. I am always happy with this. We encourage each other to work extra harder."* HSA B2.1, original EM

Benefits of DPAT

District staff in both original intervention and scale up districts identified a range of benefits of the DPATs. All the benefit types were related to **improved coordination, communication, and collaboration**, **and the availability of data** that supported improvements in performance monitoring and problem-solving. These are precisely the types of benefits that DPATs were intended to generate. The benefits listed below in the table can be considered to be common across implementation contexts, while not all benefits were mentioned specifically by staff in every district, every benefit had at least three of four districts were the benefit was described.

Perceived Benefit	Key Quotation
Enables team problem-solving around supply chain issues	*"Its [DPAT is] very beneficial because usually, we collectively solve problems. There's a lot of improvement because after our discussion, actions are taken."* IMCI Coordinator, District A, original EM *"However there are many good things because it serves as an eye opener we share different ideas. It gives us an opportunity to look at a problem holistically; it is fruitful because it is evidence based since we have something to look at. It is easy to set the agenda."* IMCI Coordinator, District B, original EM *"Because, I can't individually supervise the whole district…so the Cluster Supervisors went and raised the issues in their own areas…they raised talked about reporting rates and stockouts, and all these issues were put to rest. If the DPAT meeting didn't take place, maybe those issues wouldn't have been solved."* IMCI Coordinator District C, EM scale up
Promotes stronger linkage across levels	*"Yes, as of now DPAT has strengthened our connections. Before, HSAs, HF, and district were working on their own. With DPAT, we are all working as a team. It has helped us iron out any issues that we have compared to just having cStock without DPAT. At this time we didn't have much communication between us."* IMCI Coordinator, District D, DPAT scale up *"Our district was performing better because of those meetings and we were able to assist each other where we needed to improve; we even told DHMT where we wanted support."* IMCI Coordinator, District A, original EM
Improves relationship between DPAT members and allows for shared responsibility for supply chain	*"Also, the District Pharmacist now appreciates the issues of supplying the community. Before, it was business as usual. With DPAT, everyone appreciates the supply chain issues."* IMCI Coordinator, District C, EM scale up *"Formally we meet quarterly but if we meet in the corridors we usually share experiences and make decisions like calling the health facilities where there is a problem. We have a problem of documenting [informal meetings] but when we meet formally we document."* IMCI Coordinator, District B, original EM
Enables performance monitoring and improved/targeted supervision (data visibility allows this)	*"It [DPAT] gives us a wake-up call on issues we don't see here but are faced in the facilities. It gives us a way to plan for supervision and tells us what is happening in facilities in terms of products and what to order for our drug store."* Pharmacy Technician, District A, original EM *"Data visibility and the performance of various facilities had happened. Monitoring of products is easier. There is better coordination because of the meetings that we have been having. The system can improve communication and coordination."* IMCI Coordinator District D, DPAT scale up

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Barriers to Sustained DPAT Meetings

As with HPATs, the challenges to DPATs were related to absenteeism, lack of transportation reimbursement and allowances, and logistical challenges with scheduling and workload. The additional issue as previously mentioned is an expectation of partner support and funds to support the meeting. Partner funded review meetings tended to replace DPATs, when they are held. Because review meetings are always partner supported, they pose a risk to the DPAT – if there is no partner support and the district depends on that partner support to hold review meetings, they often also expect partner support for DPATs. Districts with partner support also often rely on partner motivation and leadership to call the meetings. Although a review of the management diaries indicates that supply chain is still addressed during review meetings, it is not clear whether all the problem-solving intended to take place in a DPAT happens in the review meetings.

This situation was seen to result in either low motivation for or no DPAT-type meetings being held at district level, reducing the opportunity for the focused, team-based approach to supply chain problem-solving which has been shown to be critical for the success of the EM /cStock intervention. More critically, the case study team identified a definite sense of "dependence" where partner support is available, with regard to both review and DPAT meetings – perhaps any district-level meeting – where district staff waited for partners to initiate the call for meetings, as well as for the financial support, before the meetings would happen. While partner support may enable DPAT meetings to occur in the short run, it also seems to detract from a sense of ownership developing over time, which will ultimately undermine the sustainability of district management for community-level product availability.

National Product Availability Teams (NPAT)

Although the NPAT is still in its infancy, the case study data shows that the NPAT is beginning to fulfil its mandate. It is monitoring the community health supply chain at the national level. The NPAT has created indicators and a scorecard to monitor district EM and supply chain performance, and has begun supervisory and support visits to the districts. The indicators used by NPAT include:

- HPAT indicators -- including percent of HFs holding HPAT meetings and percent of HSAs attending HPAT meetings

- Supply chain performance indicators – reporting rate and completeness of reporting, average lead-time, and percent of HSAs stocked out by product

> *" NPAT coordinates supply chain and any action that is happening. We are there to make sure that there is product at the community level. NPAT is important because we are able to solve problems, because we are HTSS representatives. Even in terms of reporting, we have to make sure that we're receiving good quality reports from the health facilities."* Program Logistics Officer, NPAT Member

In addition, the NPAT is coordinating and supporting the DPATs from the national level. For both this and the monitoring of performance, the dashboard is the critical data visibility and sharing mechanism. The NPAT is considered by the MOH to be critical in supporting the linkages across levels of the EM approach.

"What do you think will be critical for the institutionalization of EM, for it to be included in every day practice in the MOH?"
"Ah—at the central level, if we are not in touch with the district time and again, they will stop using it! It needs close contact with MOH so that everyone knows it's there, that the MOH has an interest in it. If the central level shows interest, it can be a motivation for the districts and HSAs." Central MOH

"What do you mean when you say 'keep in touch'?"
"With the dashboard, we can look on there to see what's going well and what's not, and we can contact people...we can call someone and say, 'I've noted from the dashboard that you haven't done 1, 2, 3, 4, do you need any support?' Or if they're doing well, we can also recognize them. The NPAT has been established and I happen to be the chair. The NPAT can have some incentives for well-performing HSAs, and even identify and support those who are not doing well. So the NPAT has to work with the DPAT to address challenges so that cStock is kept alive. Sometimes, just a visit from the central level says a lot, it says 'I've been looking at how you're doing.' We, as the NPAT, should work hand-in-hand with the DPAT, and should visit DPAT. It's motivation for them if they know that we are watching." Central MOH

"What I saw in the NPAT and DPAT is that it makes us know what is going on, like the stock levels nationally. It just needs someone to have an interest in it, because programs need to look on cStock, and to do that, they have to have the interest. And when there are challenges at the different levels, at the national level, at the district or in the village clinics, each level has a role to play. When there is a problem or an accomplishment, everyone appreciates it. Because of NPAT, we appreciate our roles. And I can also add that, with DPAT, not all HSAs are lazy to report because they are being reminded and the supervisor follows up if there's a problem. Problems are solved at the facility level or taken to the upper levels." Central MOH

Like DPAT and HPAT, NPAT members realize the benefit of having a team to work with to solve problems and to support each other in their work.

"It's not just me whose doing it but the NPAT team. There's also a supervision visit coming up, so I'll be part of the team that will be going out. These are the visits I was talking about. We are supervising them. We will be able to provide support...NPAT and DPAT can work together. Issues that can be addressed at the facility or district will be taken care of there, but we can bring back here the issues that need national attention. If it's an issue that deals with policy, the Deputy Director of HTSS has to know about it. He's not going on the supervision that's coming up, but I'm representing him." Central MOH, NPAT Member

"It's just the central level decision, because it involves all the logisticians from the different departments. When we meet, if it's about malaria, we talk about the problems and we try to solve them, but we meet as a group because some decisions are general and because we are part of the HTSS. NPAT coordinates supply chain and any action that is happening. We are there to make sure that there is product at the community level. NPAT is important because we are able to solve problems, because we are HTSS representatives. Even in terms of reporting, we have to make sure that we're receiving good quality reports from the health facilities." Central MOH, NPAT Member

Like HPATs and DPATs, the NPAT faces challenges in organizing meetings on a regular basis, in such a way that attendance can be maximized, and in conducting routine supportive supervision of the districts. NPAT has only met twice since the inception workshop in November 2013, mostly due to scheduling

conflicts and workload constraints of the members. In addition, funding is required to support the supervision work of NPAT; this issue has been addressed on an interim basis through funding support provided by a few small grants, but in the long term, more secure funding through MOH or partners will be needed.

> *"What are the challenges with the NPAT meetings?"*
> *"Maybe we are not able to do supervision or attend the DPAT meetings, because of funding. For us to move around, there needs to be funding. The other challenge is, if we're too committed to other things, we can neglect the NPAT. So we need to create time and attend the meeting."* Central MOH, NPAT Member

Respondents recognized that the NPAT is still in its infancy, and that further experience will be required to understand what other challenges and benefits may emerge.

> *"If we continue meeting, and if there's supervision. NPAT is a new baby so we still need to coordinate to take it on board together. With the coming of NPAT, we can deal with the transition. If partners are also involved, we can share challenges with them and can find a source to fund the program up to where we want it to be."* Central MOH, NPAT Member

Linking the Product Availability Teams

An integrated supply chain requires that people at different levels of the health system are linked and together are involved in managing the essential functions of the supply chain by using data about products[3]. With the EM approach, the SC4CCM project explicitly invested in designing and supporting a variety of mechanisms that would facilitate and establish critical supply chain linkages to improve IMCI product availability at the community level.

Role of Cluster Supervisors

A project concern that the case study specifically explored was whether the HPATs and DPATs were linked, providing the continuous chain of information flow and multi-level problem-solving that had been identified during intervention design as necessary for improving community-level product availability.

After the midline evaluation in early 2013, it was decided that it was not practical to have the HSA Supervisors from every HF attend the district level meeting on a quarterly basis, so instead Health Centre Cluster Supervisors should serve as the link between the two levels of teams by attending both meetings. CSs are meant to attend HPATs, communicate regularly with HFs about issues brought up at HPAT, and bring those issues for discussion to DPAT.

As the inclusion of CSs was introduced after midline in original districts, not all CSs are trained and aware that this was their new role. Original districts received an informal message about the change in role through meetings; therefore original districts were slower to make this adjustment. In District B, both CSs interviewed reported that they attended a district review meeting in December 2013; one had attended monthly HPATs, but the other reported that he did not. In the other original district (A), neither of the CSs interviewed reported attending HPATs or DPATs or review meetings. The awareness of CSs in both the original districts about their role in supporting CCM supply chain issues was low, except one Cluster Supervisor in District B who received the original training in 2011.

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[3] John Snow, Inc. Getting Products to People: The JSI Framework for Integrated Supply Chain Management in Public Health, 2012.

Original Districts

"Does this health center have HPAT meetings?" "Yes, monthly."
"Do you attend?" "Not very often"
"Do you attend DPAT meetings?" "No."
"Do you know if the District has DPAT meetings?" I don't know." Cluster Supervisor, HF A1

"Have you attended HPAT meetings before?" "No."
"Have you ever attended a DPAT meeting?" "No I haven't. With the DPAT composition, there are many of them that have not attended the meeting." Cluster Supervisor, HF A2

"I'm not trained so I haven't been called to the meetings." Cluster Supervisor, HF B1

"Have you received cStock training?" "Yes I have.
"When was this?" "It was in August 2011."
"Was this during the cStock or the DPAT trainings?" "It was during both. I was trained on them at the same time."
"How often do you have DPAT meetings?" "Monthly." Cluster Supervisor, HF B2

The situation was a bit different in the scale up districts, where the CSs received formal training in HPATs and DPATs. While CSs were aware they should be attending DPAT and HPAT meetings, attendance was mixed due to challenges. A review of the management diaries showed that the Cluster Supervisor did not attend DPATs in either district, however in one scale up district (D), district staff documented in their DPAT management diary the need to invite CSs.

In terms of HPAT meetings, in both scale up districts, while CSs knew they were supposed to attend HPATs, many did not mostly due to the lack of fuel or transport. One of the CSs in District D, although he did not attend the HPAT meetings because of fuel shortages, made phone calls to the HF to know what topics were discussed at the HPAT. The Cluster Supervisor in the other scale up district resided at the HF level and attended HPAT meetings often but had never attended a DPAT meeting.

Scale Up Districts

"By design, are you supposed to attend the HPAT meetings?"
"Yes, but I haven't been able to because of fuel problems."
"What do you do when you don't attend the HPAT?"
"I take the issues to the IMCI Coordinator at the district. I let him know about issues like the HF needing push bikes and bags for HSAs to carry the products given to them." Cluster Supervisor, HF D1

"How do you keep track of the things that are discussed during the HPAT meetings?"
"When I call the HF, they tell me about issues that were discussed such as needing bags for HSAs to carry products and also push pikes, spoons for IMCI treatment, and need stop watches for timing labor contractions."
"Do you know if DPAT meetings are taking place?"
"I am not sure. If they were happening I would have received a notice for it." Cluster Supervisor, HF D1

"How often do you have HPAT meetings?"
"We have had 3 meetings since we started...We agreed to meet on the 2nd or 3rd of the month, but we can change the date to be sure we get participation. So far we have met every two months."
"What is your role in the meeting?"
"I chair the meeting."
"Have you ever attended the DPAT meetings at the district?"
"No. I know they might have them. Only once the district came here for a review meeting."
<div align="right">Community Health Supervisor, HF C1</div>

The role of the Cluster Supervisor as the link between HPAT and DPAT, and therefore between community, HF and district levels, has yet to be fully established. Because this role has been defined as part of the scale up approach, additional guidance and leadership is needed to reinforce the CS's role in improving community level CCM product availability.

Routine Supervision and Remote Support

Supervision provides another opportunity for linking district to HF and the community; however supervision was not targeted by the project and no intervention support was provided for supervision during the intervention period. So any supervision related to cStock, DPATs and product availability is based on the initiative of the supervisors or the districts.

In a few HFs, HSAs reported that supervisors provide support on EM components, sometimes as part of routine supervision, but sometimes only if the HSA asks for assistance.

Supervision received by HSAs on EM

"Does the supervisor help you with cStock?"
"If you have a problem with cStock, they assist you."
"How does the supervisor do that?"
"If your problem is sending the message, he guides you" HSA, A2.2, original EM

"Does he help you with cStock?" *"Yeah"*
"How does he do this?"
"If there is a something that he wants to share with me he takes the cellphone and reminds me how to do it. For example, like how I can send in a cStock message when I want to request few products so he reminded me to report on all products even though what I wanted to ask from cStock are few products." HSA, B1.2, original EM

"Does the supervisor help you with cStock?" *"Yes."*
" In what ways does the supervisor help you?"
"On my part I was unable to send stock on hand then I cycled to the facility then the supervisor assisted me. The supervisor assisted me with the typing error he told me that I have typed in capital letters. So he advised me to change to small letters then message went through."
"Is there any other way you received support from the supervisor on cStock?"
"Aaaa no, it is only me to travel if I need assistance." HSA, C1.2, EM scale up

Supervision received by HFs on EM

"Have your received supervision on cStock or DPAT?"
"Yes, he even checked the discussion in the book." HSA Supervisor, HF B1, original EM

"Have you received any support or supervision on cStock?"
"Not for me, but maybe my colleague had previously." HSA Supervisor, HF D1, DPAT scale up

However, in every district we found that supervisors at all levels were challenged in conducting and completing their routine supervision of HFs or HSAs. Most respondents identified that lack of fuel/funding for fuel was a more difficult barrier. In one district, supervisors identified a lack of training as a barrier to them providing good supervision.

"Are there any other challenges?"
"They live 45, 43 kilometers from here. I don't have a motorbike at the HF so it's a challenge. Since I've been trained as an HSA supervisor, I've never conducted supervision because of transportation. Never, I cannot lie!" HSA Supervisor, HC B2, original EM

"And with the topography of this area, I was given little fuel to do my work to supervise. 17 litres is not enough for a month." CS, HC C1, EM scale up

"If the cluster supervisor is acting as a link from the HF to the district, why have issues from HF not been addressed? The cluster supervisor uses a motorcycle to visit the HFs. We have had fuel issues because of a lack of funds to buy fuel. The cluster supervisor's visiting have been a challenge. We are hoping to have an improvement." IMCI Coordinator, District D, DPAT scale up

"In May we didn't go for supervision because of lack of fuel." District Pharmacist, District D, DPAT scale up

"I am supervising the work without having any training in supervision. I need to know how to do their work if I am going to supervise." CS, District C, EM scale up

We found that some staff overcame these barriers using regular phone calls and text messages to communicate with HFs and HSAs; these calls were mostly based on performance information. In a few cases, supervisors were able to better target their minimal supervision resources based on the data that they reviewed via cStock or the dashboard.

> *"Even if I can't go to the HFs, I can provide remote supervision to see what is happening at the HFs and HSAs. I can interact via phone."* IMCI Coordinator, District D, DPAT scale up
>
> *"It gives us a wake-up call on issues we don't see here but are faced in the facilities. It gives us a way to plan for supervision and tells us what is happening in facilities in terms of products and what to order for our drug store."* Deputy IMCI Coordinator, District A, original EM

Some respondents identified supervision as important to maintaining cStock and DPAT.

> *"Do you think that supervision is necessary for cStock to continue?"*
> *"Absolutely, **supervision is very important.** Even the cluster supervisor can do this work, but they don't have motorcycles."* IMCI Coordinator, District A, original EM
>
> *"Supervision is key. When I came 8 months ago* [District D] *was at a standstill, so we use morning meetings to reinforce the importance of management, documentation, and making it clear that it is not necessary to have monetary claims to do your work. I am not going to make any promises. Even for DPAT we see no one asking for allowances; we are reinforcing meetings without allowances. I have been around to all the health facilities and I have explained the financial situation, and if I continue to supervise people they will continue to work. They just need to see the leader* [DHO] *to motivate them. **With supervision and leadership we can continue to do these** [cStock and DPAT]."* DHO, District D, DPAT scale up
>
> *"On my part there is no problem, **I rely much on supervision.** If people visit me, they encourage me so much. They should correct me where I am wrong and encourage me on my strengths."* HSA, C1.1, EM scale up

Summary

HPAT meetings occur fairly regularly and for the most part include participation by the majority of intended members and include performance monitoring and recognition as regular topics. DPAT meetings are much less regular and have much more variation in who participates; in some circumstances DPAT is limited to only district staff with no representation from HF level and in other situations the DPAT meetings include HF staff and some HSAs. Where districts can count on partner funding, they substitute a cluster review meeting for the DPAT, which does not have the same broad purpose and ability to review district-wide supply chain issues. The main gap currently is that the Cluster Supervisor, who is meant to link HPATs and DPATs is not consistently aware of the importance of their role or has been unable to execute this task. In exceptional cases, follow up is conducted via phone or during district supervision of a HF or HSA, mostly at the initiative of the District IMCI Coordinator. cStock dashboard reports have helped some districts consistently monitor performance and follow up regardless of if meetings occur. However, it is unclear if the problem-solving and communication aspects that are an important part of DPAT meetings are still getting sufficient attention.

Key Findings: Product Availability

The primary objective of the SC4CCM project in Malawi was to improve product availability at the community level with a particular focus on medicines for child health. The effectiveness of the SC4CCM intervention on improving product availability was demonstrated at HF and HSA levels at midline[4]. For the endline evaluation, we were interested in assessing whether the product availability improvements were sustained in the original pilot districts compared to the midline results and if in scale up districts, there had been in change in product availability since the intervention was introduced. Quantitative data from cStock was analyzed for the four districts included in the case study; however, the data analyzed was for the whole district and not just for the facilities that were visited in the case study. The case study findings offer some explanations for the results we see from cStock and also help us to understand if there is a connection between the availability of products and the implementation of EM approach.

cStock data was analyzed for the period starting before midline when the intervention had been rolled out to the six pilot districts (January 2012) until the endline (May 2014) when up to 24 districts had progressively been trained and had started to use cStock. For original districts, the purpose of the analysis was to understand any changes that may have occurred and could be attributed to a reduction in intense project support or if the effects seen at midline had been sustained. In the scale up districts, the purpose of the analysis for the original EPT district (District D) was to understand the impact of the addition of DPAT to see if there were any improvements in product availability. In District C, which only recently received training on the full EM package, the purpose was to understand if similar results were achieved in the short period since implementation.

The following indicators of product availability were extracted from cStock and are presented here:

- **In-stock rates** – Percent of HSAs that had each individual CCM product in stock based on the SOH reports sent to cStock each month. In-stock rates are considered to be the summary indicator for supply chain performance. The products considered are the CCM products used at the community level in Malawi however cStock does track all products at the community level.

- **Good stock rates** – Percent of HSAs that were considered to have sufficient quantities of stock. Sufficient is defined by calculating the number of months of stock (MOS) the HSA has on hand, using their consumption and stock on hand, and determining if the MOS is between the EO point (one treatment) and the maximum stock level (two months). Stock status provides a more comprehensive picture of **whether** the supply chain is maintaining stocks within the desired range and not over or under stocking.

- **Stockouts -** Stockouts refer to the absence of a specific or certain range or category of products required in the community to treat sick children. Data on stockouts is presented using the following indicators:

  o **HSA reports with a stockout** – Percent of HSA reports that contained a stockout. The report could either be the monthly SOH report or an EO report. Avoiding stockouts is a key objective of improved SCM. A stockout of any product means that product availability across a set of products is not achieved.

  o **Average number of stockouts by district, product** – Refers to the average number of stockouts experienced by an HSA over a defined period of time and can be presented by district or by product.

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[4] SC4CCM Project Team. 2013. *Malawi Community Health Supply Chain Midline Evaluation Report*. Arlington, Va.: SC4CCM. http://sc4ccm.jsi.com/files/2013/11/Malawi-Midline-Report_FINAL.pdf

- o **Duration of stockouts** – The length of period the product stock balance was zero.
- o **Proportion of the period stocked out -** The period of time that a product was stocked out as a proportion of the period under review.

HSA Product Availability for CCM Products

The following graph represents the average in-stock rates among HSAs across the five CCM products (cotrimoxazole 480mg tablets, LA 1x6, LA 2x6, ORS, zinc 20mg) for the case selection districts and nationally (it does not represent the percent of HSAs that had all CCM products). To calculate this figure, the percent of HSAs in-stock was calculated for each individual product and then the average percent of HSAs in-stock was calculated for the five products.

Figure 12: Average In-Stock Rates Across 5 CCM Products
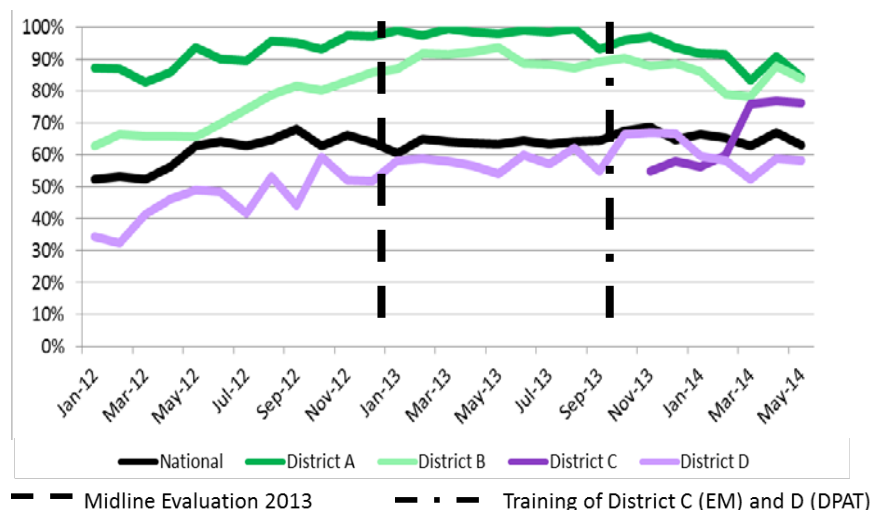
Table 22: Average Percent In-Stock Rates Across All the 5 CCM Products

Original Districts	Before midline	After midline	Scale Up Districts	Before training	After training
District A	91%	95%	**District C**	N/A	65%
District B	73%	88%	**District D**	57%	61%

When viewing the in-stock rates for each individual product, see below, we see the pattern is similar for all five products (Figure 10). Nationally, in-stock rates increased during the pilot phase (six districts) and remained fairly stable after midline (at about 65%), even as more districts were trained and more HSAs registered into cStock, with a slight decline in March 2014. For all products, the in-stock rates are higher for the original districts compared to scale up districts and the two original districts are higher than the national average. In the scale up districts, in-stock rates remain low for District D and are often below the national average. For District C, however, the in-stock rates increase across all products after March 2014 and are close to those in the original districts.

In original districts, in-stock rates steadily increased until the midline, were mostly maintained post midline, but saw a slight decrease towards the time of the endline. This slight decline may have been due to the change in drug budget policy that transferred the funds for procuring additional medicines from the district to the central level, leaving districts with less ability to respond to district level stockouts.

There were variations in product availability trends in the scale up districts. For District D, product availability was more erratic during the early stages and appears to have become steadier after midline, without much change after the DPAT trainings conducted in 2013. District C appears to have had a substantial increase in product availability in March 2014. This increase in District C may be attributed to partner supported review meetings conducted in 2014 that identified the gaps related to product availability and reinforced the HF role in resupplying the HSAs.

> *"Before, [partner] was working on IMCI but it used to deliver drugs differently. So, people are used to that system, so the In-Charges still thought that the HSAs were still getting drugs directly from [partner]. So, we had to change their attitude and tell them that the drugs they get for their facility are for everyone and should be distributed to HSAs."* Deputy IMCI Coordinator, District C, EM scale up

Average "good" stock rates are low for all districts compared to in-stock rates. Good stock rates refers to the percent of HSAs who have stock levels between the EO point and maximum stock levels, or in other words, the percent of HSAs who are able to maintain stock levels according to established rules, thereby minimizing the chance of a stockout. The low "good" stock rates in all districts suggest that when HSAs are resupplied they receive enough quantities to avoid stockouts, but are not topped to maximum levels and are at risk of stockout. This is consistent with the OFR that was seen in the resupply section, where HFs are consistently undersupplying HSAs. It is likely that HFs are not able to top up HSAs to maximum due to chronic shortages at their level, but they are prioritizing regular resupply and possibly rationing to avoid stockouts within their own facility.

Comparing districts, there is a similar pattern for "good' stock rates that is seen with in-stock rates, in that the original EM districts are generally better than the scale up districts; however similar to in-stock rates, District C shows improvement after the March review meetings and the "good" stock rates are closer to those seen in the original districts.

Figure 13: % of HSAs In-Stock Rates and Good Stock Rates by Individual CCM Products
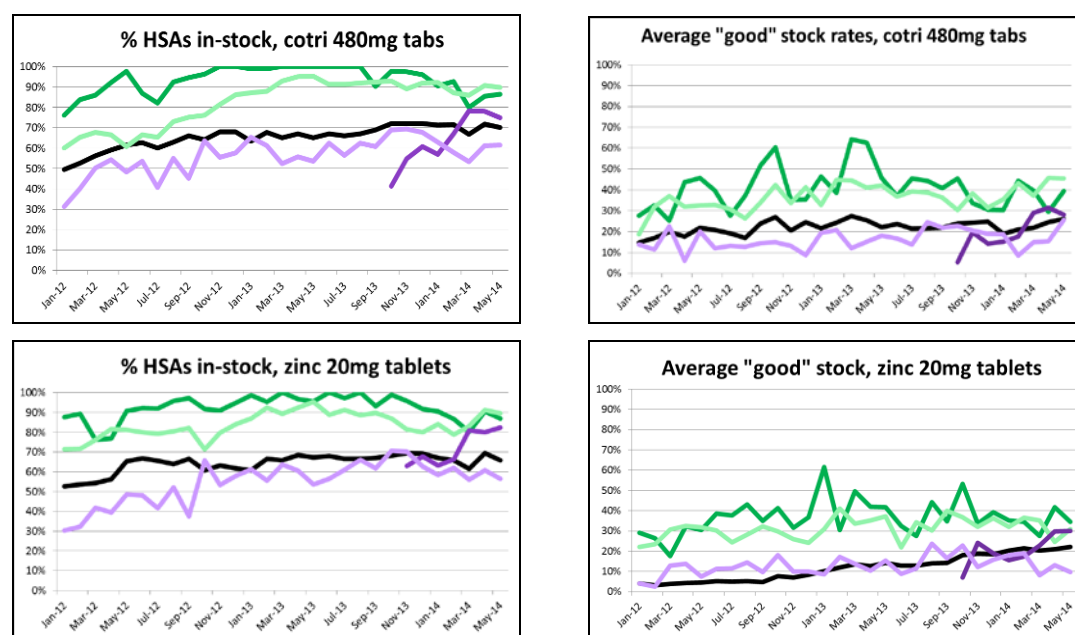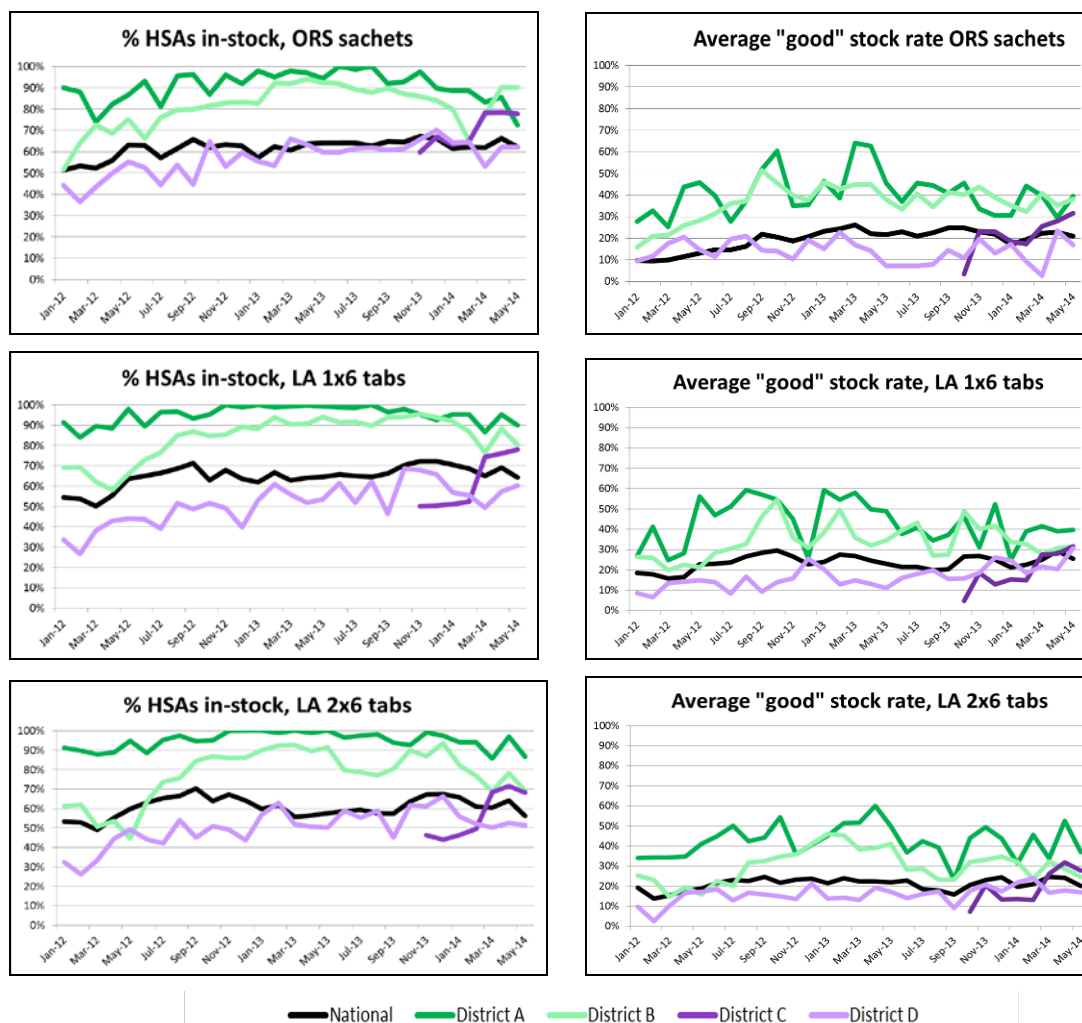
Product availability is affected by many factors outside the scope of the EM intervention. The case study points to several factors that influence product availability. One factor mentioned by respondents was the change in authority in managing the drug budget allocation from the district to central level which has prevented districts from buying products from private wholesalers and limited their ability to respond to stockouts. Districts now have to send their supplemental product requests to central level and wait to be resupplied.

> *"In the past we could get permission from CMS to buy outside, but not now. If CMS doesn't have, the district doesn't have, the health facility doesn't have and the HSAs don't have."* District Pharmacy Technician, District B, original EM

Another factor mentioned by respondents was that the quantities of some products supplied through kits are not sufficient for larger HFs with a high patient load and so HFs do not share with HSAs, prioritizing their own supply first. Previously larger HFs received more than one kit, but the most recent batch of kits was supplied as one per HF and was not adjusted to the size of the HF.

> *"Why is paracetamol a problem?"*
> *"We are not getting enough. It is coming as a kit so we were prioritizing to give it to HFs so it is used at HFs and not village clinics."* IMCI Coordinator, District D, DPAT scale up

HSA Stockouts for CCM Products

Stockouts should be considered both in terms of the number of stockouts HSAs had and in terms of duration of the stockout, which indicates how quickly the supply chain can respond to stockouts and what proportion of a period of time were HSAs stocked out of a product, to understand fully the impact of stockouts on HSAs ability to do their job of treating sick children in the community.

Figure 12 shows the average number of stockouts per HSA across all five CCM products for the case districts. The cStock findings reveal that all districts have relatively low stockout rates over each six month period under review (less than two stockouts every six months). However, Districts B and D consistently had more stockouts than Districts A and C over the different time periods.

Figure 14: Average Number of Stockouts Per HSA Across 5 CCM Products

Figure 13 presents stockout rates in a different perspective by comparing across products and not time; it presents the average number of stockouts per HSA by product over the entire period from Jan 2012 to June 2014. Looking by product, stockouts in District D are primarily with LA 1x6 and LA 2x6, sometimes reaching almost two stockouts per HSA per six months, whereas District B also had supply issues with LA 1x6 and LA 2x6 but also ORS.

Another consideration is how long a stockout lasts when it occurs. A stockout should be responded to as quickly as possible, especially in this context of life saving medicines; a common supply chain indicator used is whether the stockout was resolved within three days. Figure 14 shows the proportion of stockouts that lasted less than or greater than three days averaged across CCM products and presented by district. For all districts we see that the majority of stockouts last longer than three days: ranging from 90% in District D in January to June 2013 to 50% in District A in July to December 2012.

Figure 15: Average Number of Stockouts Per HSA Per 6 Months By Product from Jan 2012 to June 2014
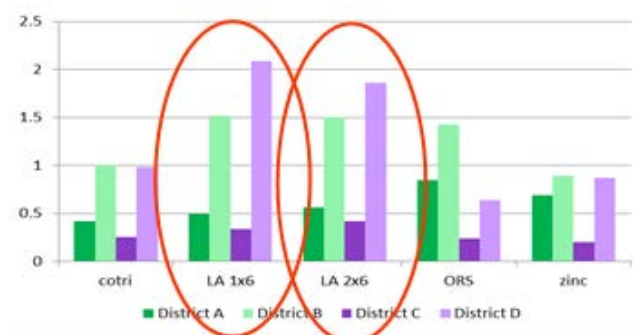
Figure 16: Proportion of Stockouts Lasting > 3 days and < 3 days, 5 CCM Products
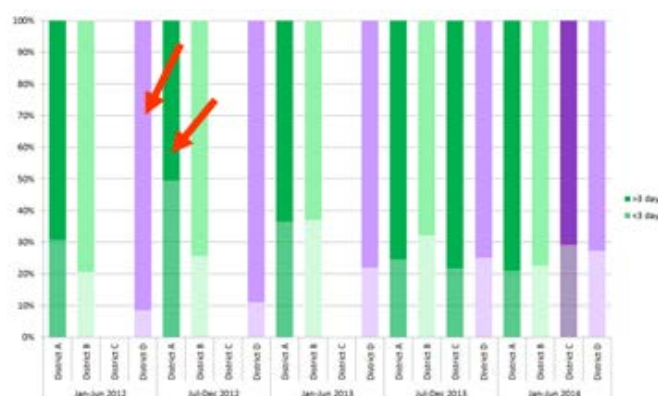
Figure 17: Proportion of Period Stocked Out for Each CCM Products
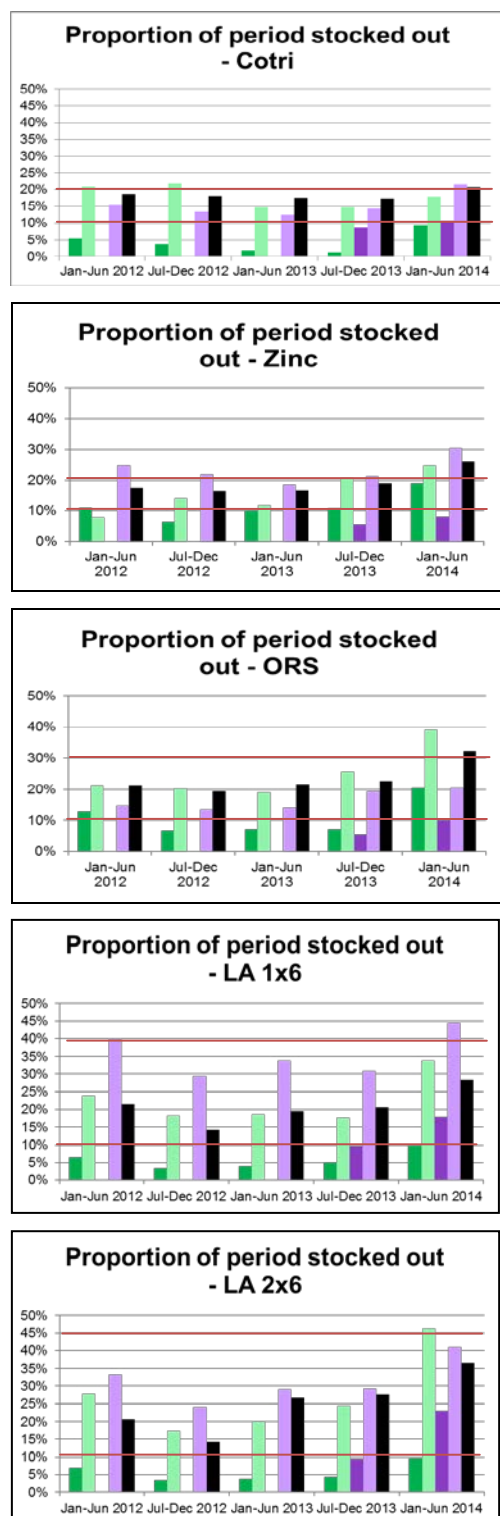
Cotrimoxazole 480mg: For the majority of districts the proportion of the period HSAs were stocked out of cotrimoxazole 480mg ranged from **18 to 54 days** in each 6 month period or **10% to 20%** of the period. District A was the exception where stockouts were lower than 5% for all periods, except for the final six months (January to June 2014) where they rose to 10%.

Zinc 20mg: The proportion of the period HSAs were stocked out for zinc ranged from **18 to 54 days** in each 6 month period or **10% to 20%** of the period. However, the proportion of period stocked out is highest for District D for each six month period.

ORS Sachets: Across the majority of districts the proportion of the period HSAs were stocked out for ORS ranged from **18 to 54 days** in each 6 month period or **10% to 30%** of the period. However, the proportion of period stocked out, over each 6 month period is highest for District B.

LA 1x6: For the majority of districts the period HSAs were stocked out of LA 1x6 ranged between **18 to 72 days** in each 6 month period or **10% to 40%** of the period. The proportion of the period stocked out, over each 6 month period is highest for district D reaching **almost 45%** of the period **or 81 days in the last six months**.

LA 2x6: For the majority of districts the period HSAs were stocked out of LA 1x6 ranged between **18 to 72 days** in each 6 month period or **10% to 40%** of the period. District D showed the highest proportion for the first four six month periods and District B was highest for the last six month period, with HSAs stocked for **45%** of the time between January to June 2014.

The high proportion of the period HSAs were stocked out for most products across most districts (except District A) suggests that when stockouts occur they are widespread for HSAs within the district and are not easily resolved. The prolonged stockouts and low good stock rates for all CCM products may indicate an insufficient quantity of products in the system, and especially at higher levels such that HFs are resupplying HSAs based on the quantities they have, but these quantities are not adequate to ensure that all those in stock have good stock levels.

The highest number of stockouts per HSA seen for LA 1X6 and 2x6 is likely due to the fact that currently LA distribution is based on HSA numbers from 2010 and does not reflect the significant recent expansion in the number of HSAs managing village clinics. District B is particularly affected given its size and density of population and the extent to which the CCM program has expanded. Additionally, LA 2x6 has been in short supply for a long time and 1x6 may have been used as a substitute for required cases; this shortage may not have been anticipated and catered for.

Benefits of EM on Product Availability

Despite the variations in product availability across the original and scale up districts, case study data show that all HSA, HF and district staff recognized several benefits of the EM package on the availability of CCM products. The perception was that DPATs and HPATs have created a platform that enable multilevel teams to discuss and problem-solve issues around supplies. They also acknowledged that cStock had improved visibility into community stock levels and facilitated quicker responses to stockouts and EOs by higher levels. The table below provides a range of benefits that were reported.

Benefit:	Key Quotation:
HPATs create a platform for product availability problem-solving	*"Really, there is an effect because when they meet and discuss, they are able to solve challenges. If they have a stockout, they can prevent it from happening next time."* Cluster Supervisor, HF B1, original EM *"We don't have stockouts because the meetings help us. If we have a problem there is a protocol we follow. We resolve the issues."* HF In-Charge, HF C2, EM scale up
cStock makes it easy to report EOs and get products faster	*"The good thing about cStock is that when you see that your products are few you send the emergency order and the system is very fast when you want to order products."* HSA, B2.2, original EM
Coordination on product availability between HF and District	*"Yes, because it strengthens the coordination between the HPAT and DPAT team that helps keep enough product."* HSA Supervisor HF D1, DPAT scale up
Improved visibility as to when HSAs need products	*"Yes, a very big difference. Before, we were just working; it was business as usual. We weren't sure if the village clinics were doing their work. With cStock, everyone is active; everyone knows that HSAs have to report, that they need products."* IMCI Coordinator, District C, EM scale up
Better connection to the national supply chain	*"Emm...this time, I can say it's better because all the parties are being involved now. If there's a stockout, it's because there is a national problem."* Cluster Supervisor, HF C1, EM scale up

National Product Availability: A Risk to EM Sustainability

Continuous availability of CCM products through the supply chain is critical to maintaining the gains and benefits achieved so far with uptake, scale and institutionalization of EM. If availability of CCM products remains unreliable there is a risk that the motivation of HSAs and HF staff to use cStock correctly and consistently and for HPATs to meet routinely will be reduced.

> _"I noticed that most of your entries are for reporting, do you mention product availability during the DPAT meetings?"_
> _"This is done verbally because product availability is a chronic problem._ **_Even if I kept talking about the problem it will persist. It is like singing a song even if the song has no message."_** HSA Supervisor, HF B1, original EM

MOH does, however, recognize that product availability is a challenge to sustaining the EM approach.

> _"What about the challenges of EM?"_
> _" Right now,_ **_the challenge is the issue of product availability at the HF._** _In our system, there are a number of supply chain systems. The main one is CMST which is supposed to supply the HFs with all the essential medicines but it wasn't doing that so kits had to be distributed, but that's short-lived. Right now, kits are being distributed.....So, product availability at the HF impacts product availability at the HSA level. We expect to be better after the kits."_ Central MOH
>
> _"What have been the challenges on EM in terms of DPAT, HPAT, and cStock?"_
> _"I can't highlight the challenges,_ **_but with the scaling up in the districts, we saw differences in product availability with medicines in districts where EM was introduced_** _and in those where it was not. There was a lot of demand in places without EM and there was a delay to scale up in all the districts. We needed to reach other districts in implementing EM in a short period of time."_ Central MOH

Key Findings: Institutionalization

In addition to testing supply chain interventions to improve product availability at the community level, the project worked with the MOH and implementing partners to take the proven intervention chosen by the MOH, the EM approach, to scale and to work to institutionalize the intervention within the Ministry's systems, processes and structures.

Progress in Institutionalizing EM

As the EM approach has been taken to scale, institutionalization of certain aspects of EM has begun – namely, the establishment of structures (NPAT, DPAT, HPAT) within the MOH concerned with managing the EM approach, the routine use of cStock for reporting, and the reliance on cStock for data to monitor product availability and supply chain performance at the community level.

Institutionalization occurs when the innovations that have been developed and proven successful are adapted for and integrated into the structure and systems of the organization responsible for providing and supporting community case management services, in most cases the Ministry of Health, and that the innovation becomes a standard business practice of the organization.

The study found evidence of integration of EM into existing structures and processes, an important step towards the institutionalization of the EM approach. However, in most cases institutionalization has only just begun and there are risks to the institutionalization process.

These risks include lack of product availability, staffing challenges within HTSS, funding for cStock, and staff turnover.

Use of cStock as a Standard Practice

The findings from the study show that the use of cStock is a standard practice to report logistics data and inform HSA resupply at HSAs, HFs and district levels.

"I first count the total number of drugs used against cases seen. I send a report on what is left on my drug box, the system acknowledges receipt of the message. Then the order ready message comes on my phone. I go to the facility then collect the drugs then I send a receipt message. Then the system acknowledges receipt of my message again. During the mid-month I do send emergency order if my stocks are low." HSA, C2.1, EM scale up

"After getting a message, I document the information in this one [pointing to the notebook that had the RSWs]. Then, we coordinate with the In-Charge to prepack the drugs, then I respond to the orders so that the HSAs can come collect the supplies." HSA Supervisor, HF B2, original EM

However, with staff turnover there is a need to train new staff on the EM approach; new staff orientation is mostly ad hoc, and the responsibility of the IMCI Coordinator who may not be immediately available to train new HSAs or staff at HFs, and usually does this orientation through on-the-job training which may not be sufficient to fully instill the skills.

> *"When you have new staff, who orients them?"*
> *"If it is the HF In-Charge, I orient him and advise him to liaise with the senior HSA of his facility to get on-the-job training; if they are more than five we organize a training for two to three days."*
> IMCI Coordinator, District B, original EM
>
> *"If new staff that join, how are they trained?"*
> *"I have to provide them with onsite on-the-job training."*
> *"So you are responsible to do on-the-job training, what about the In-Charge?"*
> *"He too is responsible."* IMCI Coordinator, District D, DPAT scale up

With the extent of staff turnover already seen (note Table 5), the informal process for training new staff on EM presents a risk to the consistent and continued use of cStock for reporting and resupply. A core team of MOH EM trainers has been developed over the years to train staff as part of the pilot implementation and scale up of EM. However, without sufficient coordination and funding this valuable team of trainers will not be able to help address the staff turnover challenge.

> *"The turnover issue has existed and will continue to exist within a system. You need to acknowledge that, when we started EM we said that we need to build capacity. Since 2010, with the coming of EM the focus was on capacity building. Then mid-way we observed the turnover issues and issues of review meetings, refreshers and filling in gaps. We said that those would be managed once we scale up at the national level. We have a team of individuals that can handle these things and so we will go back there with partner support to orient people. Staff turnover isn't the only problem, but it's also with the DHO who move around from one office to another. So partner support assured us of this."*
> Central MOH

Integration of NPAT, DPAT and HPAT into Existing Structures

While happening from time to time, NPAT, DPAT and HPAT meetings are not being held routinely so are not yet a standard practice of staff implementing the EM approach. This is due to a variety of reasons, including among others: competing priorities, lack of incentives to attend meetings, and difficulties in traveling to meetings. The case study shows examples of opportunities to foster meetings as a standard practice, including:

- Linking HPAT meetings to product pickup

- Integration of DPAT topics and issues into other existing meetings, reducing logistical barriers to having the meeting

> *"All the HSAs converge for the meetings. The advantage of meeting is that other HSAs who don't do CCM are also there, and we can address several issues at once. Instead of having two meetings, we do it all at once."* Cluster Supervisor, HF A1, original EM
>
> *"The DHO has overall review meetings—that is, meeting for all programs, not just cStock. So I remember one meeting where we talked about cStock. It was mentioned but we talked about other programs too."* Cluster Supervisor, HF B1, original EM

Another aspect of institutionalization of EM is the linkages that are forged through the approach with existing organizational structures to help promote the availability of products at the community level. In one district, links have been developed between DPATs and Drugs Therapeutic Committee

(DTC)/DHMT, demonstrating an opportunity for other districts to improve the districts' ability to respond to stockouts.

> *"When I want to have data or back up for the DTC, I can get it from the dashboard. I now have data to present at the meeting. The only problem now is that the district doesn't have budget, but I can use the dashboard data to show what is needed."* Pharmacy Technician, District B, original EM
>
> *"We use DPAT to influence DHMT and other partners to assist us. For example, last year we registered 72 HSAs on the system but they were having problems with reporting so we presented this to decision makers and funds were released for training in order to improve district indicators because we always strive to be number one in the country. The DHO at one time asked me to give him my password so that he could access cStock and when he saw that some of the products are not available, he made a decision to look for funds so that we can procure those products and that is why we include the DMO in DPAT meetings."* IMCI Coordinator, District B, original EM

Risks to Institutionalization of EM

While this evidence of institutionalization of EM within the MOH is encouraging, there remain risks to institutionalization that will need to be attended to. These risks include staffing challenges within HTSS, limited availability of community health products in the national pipeline, and continued funding for cStock and related support activities. Many of these are recognized by MOH management as seen in the case study findings presented here.

Staffing Challenges

Given its supply chain and product availability mandate, HTSS has been identified by the MOH as the unit responsible for the continued management of and support to EM implementation. To continue to appreciate the benefits already realized with EM and to further institutionalization of cStock and product availability teams as standard practices within the organization at the central, district, HF and community levels, HTSS must take leadership for the EM approach, support each level in the system in managing their part of EM, ensure adequate human and financial resources are committed to the work, and coordinate program and partner inputs for the community health supply chain. The HTSS will need to consider and ensure that they have sufficient staffing needed to do this work.

> *"But because there are so many things happening, you find yourself doing a different job every day. With the coming of the [IWG secondee]—no, even him, he's not there to stay. At the moment, the Deputy Director of HTSS is pushing for the office to be a directorate because that would allow us to fill vacant positions, like having a pharmacist for LMIS, a person for management, a person for rational use, a person for quantification."* Central MOH

While HTSS has the main supply chain mandate, the MOH recognizes that in order to institutionalize EM and maximize its benefits, there must be coordination between HTSS and the programs, not only because several programs are concerned with products at the community level, but because these programs also bring resources that can be used to support management of EM.

> *"What are other things are needed for institutionalization* [of EM]*?"*
> *…We want an opportunity that looks beyond one program. All should use one mechanism and system so we are all talking the same language. A lot has happened with child health products. There are other programs that need help and that work at the community level."* Central MOH

The NPAT was established to monitor supply chain performance at the community level and provide support to the DPATs and HPATs. This nascent unit needs to be committed and needs the support and leadership of HTSS, and the resources that HTSS can garner through partner coordination, to be institutionalized and successful in its work, particularly at this early stage of development.

> *"Also, the national team needs to be committed. If there's no one from the central level who's committed and monitors the progress, cStock will die a natural death because the districts will neglect it too. DPAT needs support from the NPAT."* Central MOH

National Product Availability

With insufficient products in the system, there is significant potential to undermine the continued functioning of cStock, DPATs and HPATs. Given that the purpose of cStock and DPAT/HPAT is to improve product availability at the community level, if there is not sufficient product in the pipeline overall, then efforts to use cStock and to solve supply chain issues through DPAT and HPAT meetings are fruitless. This situation could quickly frustrate and discourage staff who will soon give up using the EM approach when they see no results. It is important that national quantification includes forecasting and supply planning for community level requirements to avoid this situation, but without good data on community health product consumption and stock status, both of which can be obtained through cStock, the quantification will be ill-informed.

> *"Right now the challenge is the issue of product availability at the HF. In our system, there are a number of supply chain systems. The main one is CMST which is supposed to supply the HFs with all the essential medicines but it wasn't doing that so kits had to be distributed, but that's short-lived. Right now, kits are being distributed but it's coming to an end because it was only meant for five months, from April to August. So, product availability at the HF impacts product availability at the HSA level. We expect to be better after the kits stop…because there's a consignment and I happen to be part of the team. When I went on supervision and CMST was supposedly supplying, I was surprised because I just saw condoms…there were no essential medicines from CMST. So for now, all essential medicines come in kits, supported by the Norwegian government, not CMST. But DFID has just handed over the consignment to CMST."* Central MOH

Funding

Another risk to the institutionalization of the EM approach is the continued funding of its activities. The operation of cStock requires payment of telephone service and message fees, server, software and maintenance costs, as well as system administration and other costs. In addition, there are costs such as staff training and supervision that need to be considered. While the project has worked to seek and coordinate funding for EM expenses through initiatives such as Reproductive, Maternal, Neonatal and Child Health Trust Fund (UNICEF), these are short-term and therefore there is a risk to the continuation of EM should HTSS and the MOH not consider long term budgeting and funding for this approach.

"Sometimes, there are no financial resources because with the government, funding is seasonal…like, towards elections, funding is cut. Even vehicles are taken out from the districts! So, some seasonal activities can affect things, but this doesn't happen too often. Elections are every five years, for example. But this can even happen because of occasions like Independence Day, which is every year. So you can plan something and have it be cancelled because of something like this."
Central MOH

"… at the MOH level we need to have leadership and managing beyond CCM products. We initiated this from last year and this year where we said that 'we need to look at the costs to maintain the cStock messages'. At the moment we are comfortable to discuss this with partners who have promised to support. There have been meetings to discuss this before JSI stops. This is a key step looked at so far. We have been proposing to ensure that we have it be vibrant and ensure EM."
Central MOH

Discussion: Enabling and Sustaining EM

Quantitative data and the case study support, that as a matter of practice, HSAs use cStock routinely to report stock on hand data at the beginning of each month. HFs prepack orders as a standard practice and notify HSAs when the order is ready. However, the quantities of products resupplied to HSA are sometimes not based solely on the cStock recommended quantities, as was intended in the original design. Users of cStock could identify many benefits of the system and were generally very enthusiastic about the system. However, a number of challenges do need to be managed to ensure users continue to have confidence in the system, that the connection is reliable, and that users trust the data. The risk to the sustainability of cStock is primarily related to running costs for the system; while they are small, it is imperative that they are paid in full and on time or the system will stop functioning.

There was no question at the time of the midline evaluation that Product Availability Teams (PATs) were needed as part of a successful approach to improving CCM product availability at the community level; the HPAT and DPAT were explicitly identified as a necessary part of the scale up package, and the NPAT was conceived and created at the same time. The endline evaluation findings further confirm how necessary the PATs are to improved SCM, and go on to identify a range of benefits beyond product availability and SCM, as well.

It was clear from the case study that the PAT meetings are essential for cultivating a team-based approach to SCM, for building relationships that enable and facilitate collaboration and coordination. The benefits to **coordination, communication, and collaboration** derived from PATs cannot be over-stated; multiple benefits contributing to team-building, collective problem-solving and improved relationships were identified by all levels and in both original and scale up districts, as well as at the central level. The PAT meetings are essential for creating the links along the supply chain and defining clear roles and responsibilities for members at each level.

The qualitative data collection approach also allowed us to understand that these benefits were easily identified by all respondents, and that they were identified in response to a variety of questions on HPAT/DPAT, cStock, and product availability, demonstrating that benefits of both quality improvement parts of the EM intervention were rapid, universal, far-reaching and pervasive.

Yet, we also clearly identified that holding meetings at all levels is difficult. The challenges to all the PAT meetings stem from the additional work burden that these meetings naturally require – time and effort to travel and attend, effort to schedule, and these are the same barriers to inter-level participation in meetings when they occur. The pattern of findings on HPAT and DPAT challenges across implementation contexts suggests that the logistical issues may become even more of a challenge over time, and a possible barrier to making these critical meetings routine. The fact that these logistical challenges are recalled and identified even when there has been a long hiatus in PATs suggests that these are normal barriers to most inter-level meetings. While this may appear to present an insurmountable, entrenched problem, it also implies that if solutions to these issues can be identified for PATs, they may also clear up bottlenecks for other system-wide linkages.

Regardless of the challenges, HSAs still attended HPATs, CSs showed interest in attending DPATs and following-up with HFs or attending HPATs, and the NPAT members recognized the need for more direct follow-up to the districts. The PAT benefits identified by respondents at all levels, in all districts, were precisely those that the project intended to generate through these meetings, and were critical to any successes of the resupply procedures implemented through the mobile platform, cStock.

Partner support seems to help with holding meetings, but this does not offer a reliable source of support for PAT meetings, and may even create an undesirable dependence. Integrating PAT and review meetings at the district level would streamline meetings, but there would need to be a way to ensure that the supply

chain is reviewed in the same way as in a DPAT – this should be possible, as our review of management diaries indicates that this was achieved in district level meetings during 2014. Adapting the PAT meeting to more easily link with the lower level is another possible strategy. CSs have replaced HSA Supervisors as the community-district link and districts have shown creativity in holding DPATs at the cluster, instead of expecting the CSs to attend a district-level meeting. Other efficiencies for holding meetings could be identified.

The PATs are also designed to be responsible for the performance monitoring and continuous improvement that are the central pillars to the EM approach. They are meant to use data from cStock to identify performance problems and keep track of improvement, and to identify good performers for recognition and motivation. While this is often done in relation to PAT meetings where performance indicators are discussed and good performers are recognized, this is also sometimes done outside the PAT meetings. Because key health staff have mobile phones and access to internet, where there is sufficient network coverage and staff are provided with adequate air time, the dashboard can be accessed and reviewed, and messages about performance problems or good achievement can be communicated remotely, without the meeting mechanism.

Outside of the meeting mechanisms, increasing access to the dashboard may be another way to create stronger inter-level linkages; ensuring all District Pharmacy Technicians and Program Coordinators have access to cStock would spread cStock knowledge and responsibility for resupply, as well as strengthen the linkages and improve the demand for and attendance at DPATs and HPATs. Routine supervision offers another opportunity for linking, as well as communication, motivation, and relationship-building. However, supervision is prey to the same barriers as holding meetings, and therefore is not currently done routinely.

The critical piece of the scaling puzzle is figuring out how to facilitate regular PAT meetings, and especially inter-level linkages – not only through the meetings, but also taking advantage of other options that are available because of the mobile platform and dashboard. How to overcome the logistic and financial challenges to institutionalizing PAT meetings, in the long run, will be the key to sustaining the EM intervention and its associated benefits of improved supply chain performance and product availability.

Ultimately it does appear as though EM has had a lasting beneficial effect on product availability at the community level. Despite chronic and lasting shortages of essential medicines in the public health supply chain, partially as a result of Malawi's economic and financial woes in recent years, we see HFs and districts ensuring that HSAs do receive their share of products so that children under five can continue being treated. This willingness to share and prioritize supply to HSAs, who would traditionally be the most vulnerable to shortages and the lowest priority for receiving scarce supplies, can be attributed to the common goal DPATs and HPATs have established of reducing stockouts in communities and the increased sense of trust, collaboration and coordination that these meetings have fostered. The ability of HFs and districts to ensure that products are distributed where they are most needed is very likely due to timely and available information from cStock, which provides data for these key decisions.

Recommendations

Based on the results of the endline evaluation and discussions of the results with relevant stakeholders from the dissemination workshop (participant lists are included in Appendix 8), the following recommendations were jointly developed by SC4CCM and stakeholders in four key areas:

1. Improve operationalization of Product Availability Teams in all districts at all levels of the system

2. Identify and secure cStock medium term and long term funding support

3. Strengthen institutionalization of the EM approach

4. Improve product availability at national level to ensure adequate availability at community level

A detailed list of action items is included in Appendix 9.

1. Improve operationalization of Product Availability Teams in all districts at all levels of the system

Health Facility Product Availability Teams

For the benefits of the HPATs to be realized – better product availability and supply chain performance as well as communication, collaboration and coordination – meetings must occur regularly, HF staff must track and take action to improve supply chain performance and there must be a clear link with district level for problems that cannot be solved locally. The importance of regular HPAT meetings needs to be reinforced by district level staff (both DPAT and DHMT) and HF staff should be encouraged to align meetings with product collection to maximize regularity. District staff should also reinforce the correct and consistent use of the resupply worksheet for recording transactions and for performance monitoring. District staff must also ensure that HPATs have access to the district performance plan by including it in the management diary for HFs to reference. Finally the role of CSs as the link between the HF level and the district level needs to be reinforced and CSs should be encouraged to attend HPAT meetings to support HFs and to take the responsibility of escalating bigger problems to the district level.

District Product Availability Team s

DPAT meetings with the intended participants proved to be less regular than the HPAT meetings due to challenges with bringing CSs or HF representation to the meetings. In some districts DPATs were substituted by cluster-based meetings; however this is not a good substitute since they focus primarily on cluster based issues and do not address district wide issues. The district level meetings are important for addressing district wide issues that cannot be solved at lower levels. Central level staff, NPAT members, and DHMT must promote and support the regularity of quarterly DPAT meetings with the intended participants. District level DPAT members should be encouraged to explore opportunities to overcome some of the barriers to holding these meetings such as integrating DPAT issues with regular and already existing district level meetings where possible.

The district level DPAT members must show leadership by continuing to regularly access the cStock dashboard, monitor key performance indicators such as reporting rates, lead times, stockout rates and emergency order rates, and follow up regularly on HPAT activities and responding to the issues raised by the HPATs. This will increase the motivation of HF staff to continue to conduct the necessary HPAT activities each month. The DPAT performance plan must be shared and used to manage expectations about the kinds of issues DPATs can resolve, to ensure that HPATs are not demotivated when issues they

raise are outside the scope of the DPAT and are not resolved, as we saw in one facility where HPAT meetings had ceased for this reason.

The link between DPAT and HPAT must be maintained or created if the DPATs are to be fully implemented and the benefits realized. The DHMT must take responsibility to reinforce the role of CSs in linking HPATs with the DPAT. First steps are to raise awareness, train and mandate CSs to play this role of linking HPATs and DPATs and then working with CSs to find opportunities for them to play this role that are not resource intensive.

DPAT activities should be mainstreamed into the District Implementation Plan; this includes such activities as meetings and supervision. Supervision of HPAT activities at HFs should be conducted on a regular basis by district staff; this does not need to be a stand-alone activity but could be integrated into regular supervision. Supervision can be informed by data from the cStock dashboard, which can help target feedback and support. There also needs to be a clear induction plan for new staff that mainstreams EM into district induction package, including PAs.

National Product Availability Team

The NPAT will be important to ensuring the EM approach is fully implemented and sustained. The NPAT needs to meet regularly and provide routine support and feedback to DPATs to help solve their challenges. The NPAT needs to regularly monitor the cStock outputs and consider issues from a national perspective to continuous support and improve the overall supply chain. The NPAT is responsible for continually monitoring the intervention and making refinements to the EM approach to ensure it is appropriate for the changing environment.

2.   Identify and secure cStock medium term and long term funding support

cStock is currently supported through the Reproductive, Maternal, Neonatal and Child Health Trust Fund (UNICEF) until December 2014. Funding for the full package in the interim is not assured and funding for 2015 and 2016 must be obtained to support cStock system operations.

Many of the system requirements needed to sustain cStock have been identified and documented in the five year transition plan. Over the next five years, cStock should be integrated into the MOH systems and be supported financially and technically from within MOH. The transition plan outlines the steps necessary to do this. However, the endline evaluation identified some new medium term recommendations:

1. Obtain funding for and implement an upgrade to cStock to make the resupply quantities required tab more user-friendly so as to facilitate distribution planning. Develop specs and source for funding.

2. Develop clear protocols for adding and removing products to cStock product list and change of pack size protocol.

3.   Strengthen institutionalization of the EM approach

The NPAT has an important role in institutionalizing the EM approach by taking practical steps aimed at integrating EM into the standard MOH system structure and tools including: routine program monitoring and supervision checklists, new staff induction guidelines, SOPs and job aid, and basic CCM training package. The NPAT should also promote regular use of cStock data for program and supply chain system monitoring and management to support distribution planning, targeted supervision, quantification, and supply chain problem solving at the community level.

4.   Improve product availability at national level to ensure adequate availability at community level

Products for the community level need to be available on a consistent basis in the main national pipeline system. This will require annual quantifications based on both reliable service data and consumption data from cStock; quantifications should be used to develop procurement plans and mobilize resources. Procurement by different stakeholders should be well coordinated and based on the procurement plans. Quantifications and procurement plans should be regularly monitored and updated based on actual consumption throughout the year.

Closing Statements

Over the years that the SC4CCM project has been working in Malawi, the CCM program has expanded to all districts and the strategy has contributed to Malawi reaching its Millennium Development Goal 4. The continued success of this program will require that a strong and robust supply chain is in place to ensure that lifesaving medicines reach the community. The Enhanced Management approach has proven to be successful in creating a supply chain where data is visible and used and where staff are motivated to take responsibility and work together to improve the performance of the supply chain. The results have shown that there is a willingness to share and ration supply among HSAs which can be attributed to the common goal of the DPATs and HPATs in reducing stockouts and the increased sense of trust, collaboration and coordination that these teams have fostered. However, ensuring that both cStock and the Product Availability Teams are sustained will require commitment and ongoing support from stakeholders at all levels – implementing partners, MOH policy, and the operational levels. Teams must be encouraged to meet, monitor, and take actions to improve their performance. cStock will require ongoing support financially and technically so that it can continue to support and meet the needs of the supply chain. Most importantly, efforts will be required to ensure that products are available from the central level to meet the needs of the community and that products reach the lower level so that HSAs can continue to do their important work of treating and managing sick children in the community.

Appendix 1: Timetable of Scale of EM

DISTRICT	Partner	cStock trained	DPAT trained
Nkhotakota	SC4CCM (EM)	Jun 2011	Jun 2011
Nkhata Bay	SC4CCM (EPT)	Jun 2011	Oct 2013
Kasungu	SC4CCM (EM)	Aug 2011	Aug 2011
Mulanje	SC4CCM (EPT)	Aug 2011	Oct 2013
Nsanje	SC4CCM (EM)	Oct 2011	Oct 2011
Machinga	SC4CCM (EPT)	Oct 2011	Feb 2014
Dedza	WHO	Oct 2012	Aug/Sept 2013
Lilongwe	WHO	Oct 2012	Aug/Sept 2013
Karonga	WHO	Dec 2012	Aug/Sept 2013
Mzimba North	WHO	Jan 2013	Aug/Sept 2013
Mzimba South	WHO	Jan 2013	Aug/Sept 2013
Chiradzulu	WHO	Feb 2013	Aug/Sept 2013
Ntcheu	WHO	Feb 2013	Aug/Sept 2013
Phalombe	WHO	Apr 2013	Aug/Sept 2013
Balaka	WHO	May 2013	Aug/Sept 2013
Ntchisi	Save	Jul 2013	Jul 2013
Thyolo	Save	Oct 2013	Oct 2013
Likoma	SC4CCM (new)	Oct 2013	Oct 2013
Mchinji	Save	Oct 2013	Oct 2013
Neno	Save	Nov 2013	Nov 2013
Mwanza	Save	Dec 2013	Dec 2013
Chitipa	SSDI	Jan 2014	Jan 2014
Dowa	SSDI	Jan 2014	Jan 2014
Rumphi	IWG (SC4CCM)	May 2014	May 2014
Chikhwawa	SSDI	Jun 2014	Jun 2014
Salima	SSDI	Jun 2014	Jun 2014
Zomba	SSDI	Jul 2014	Jul 2014
Mangochi	SSDI	Aug 2014	Aug 2014
Blantyre	IWG (SC4CCM)	Oct 2014	Oct 2014

Appendix 2: Timeline of Activities

Pilop phase		Scale up phase	
2011	2012	2013	2014

cStock developed, tested and deployed

TOT conducted

3 pilot districts trained in cStock +DPAT, 3 pilot districts trained in cStock (EPT)

Dashboard significantly revised

3 districts trained in cStock only (WHO)

cStock +DPATs endorsed for scale up

Orientation of DHMTs added to scale up package

TOT conducted

6 districts trained in cStock only (WHO)

5 districts trained in cStock + DPAT (Save)

13 districts trained in DPAT only (9 WHO, 4 SC4)

NPAT launched

7 districts trained in cStock +DPATs (6 SSDI/1 IWG)

Cumulative No. districts trained	6	9	21	28
HSAs trained	638	971	2208	2943

Appendix 3: Initial Conceptual Framework for EM Intervention in Malawi
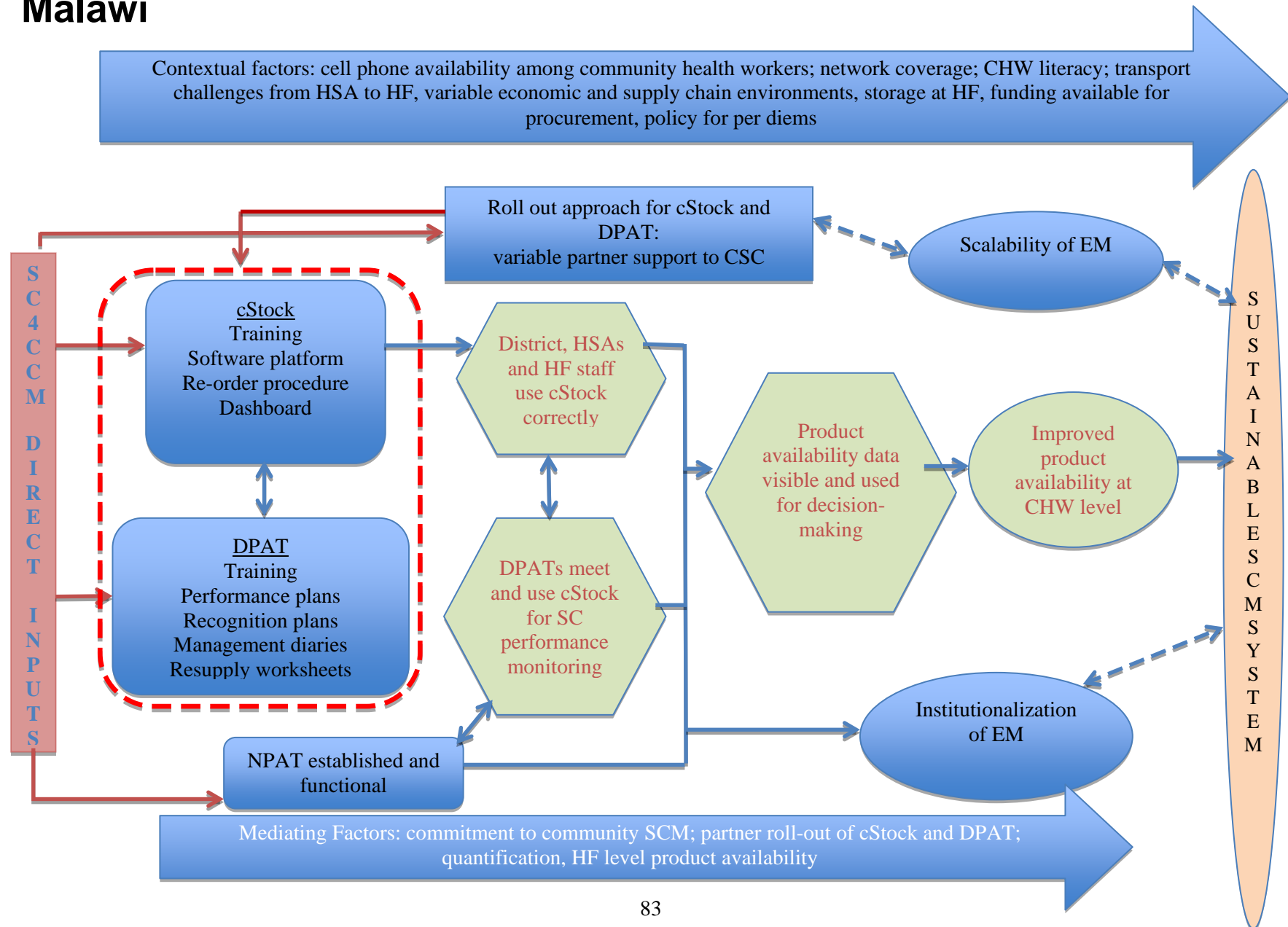
Appendix 4: Case Selection for SC4CCM Qualitative Endline Case Studies

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                        │  Case selection strategy │
                        │  SC4CCM Endline Evaluation│
                        │  June-July 2014          │
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| Original Intervention Districts | | | | New Intervention Districts | | | |

District A	District B	District C	District D
Best performing in PA at midline	Lowest performing in PA at midline	SAVE – selected randomly	SC4 – selected purposefully (EPT)

| CS A1 | CS A2 | CS B1 | CS B2 | CS C1 | CS C2 | CS D1 | CS D2 |

HF A1	HF A2	HF B1	HF B2	HF C1	HF C2	HF D1	HF D2
High reporting/ High	High reporting/ Low	High reporting/ High	High reporting/ Low	High reporting	Low reporting	High reporting	Low reporting

HSA A1.1	HSA A2.1	HSA B1.1	HSA B2.1	HSA C1.1	HSA C2.1	HSA D1.1	HSA D2.1
Close	Close	Close	Close	Close	Close	Close	Close

HSA A1.2	HSA A2.2	HSA B1.2	HSA B2.2	HSA C1.2	HSA C2.2	HSA D1.2	HSA D2.2
Far	Far	Far	Far	Far	Far	Far	Far

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Appendix 5: Performance Indicators Used for Case Selection

Case selection for Districts

- Original EM District to assess sustainability

    o highest and lowest performers in terms of product availability as measured between baseline and midline

- Scale up districts to assess scalability

    o one based on the EPT model (additive DPAT model-selected purposefully based on more stable IMCI Coordinator leadership)

    o one on the partner model (partner support model-selected randomly)

Case selection criteria for HFs and HSAs

- Two HFs per district selected in original districts- both high performing on on-time reporting indicator, one per district with high frequency of HPAT, one per district with low frequency of HPAT

- Two HFs per district selected in the scale up districts - one high on-time reporting HF and one low on-time reporting HF.

- Two HSAs per HF – one HSA far and one HSA close to the HF

Product availability at HSA for district selection

- Average % HSAs in stock of CCM products, by FACILITY (*source: Stock Status tab, "% HSA stockouts by product" report Jan-Mar '14, inversion of %HSA stockouts*)

    1. cotrimoxazole 480mg

    2. LA 1x6

    3. LA 2x6

    4. ORS

    5. paracetamol 500mg

    6. pill bags

    7. tetracycline eye ointment

    8. zinc 20mg

Key Supply Chain Process/Performance Indicators at HFs and HSAs

- Original Districts - Number of HPAT meetings held over 3 month period, by facility (source: BSC reporting, Oct – Dec 2013)

- % HSAs submitting reports on time, by facility (source: Reporting Rates tab, Ave reporting rate – facilities, Jan-Mar'14

Appendix 6: Data Collection Plans for Each Level

Data collection plan for HSAs

The team will conduct 1 data collection activity with HSAs at the health centre:

1. In-depth interviews with HSAs

Data Collection Plan for Health Centre Staff

The team will conduct at least 3 data collection activities at the health center:

1. In-depth interviews (minimum 3) – Cluster Supervisor, HSA Supervisor, Drug Store In-Charge

2. Observe Management Dairy/Notebook

3. Observe Resupply Procedure Worksheets

4. Photos – of health facility

Data Collection Plan for Districts

The team will conduct 3 data collection activities at the district:

1. In-depth interviews (minimum 3, up to 5)

2. Observe Dashboard use

3. Observe Management Diaries

Appendix 7: Program Impact Theory for EM, based on Endline Evaluation evidence

National Product Availability: quantification, supply planning, coordination, funding available for procurement, centralization of district drug budget

Development of tools

cStock system (includes piloting)

SOPs

Training materials

EM Training

Knowledge and skills in resupply process using cStock

Establishes common goal, performance indicators and recognition

Establish link between district / HC / HSAs

Initial follow up after initial training – monitoring of uptake, supervision review meetings

Knowledge and skills

Access to and acceptability of tools

Motivation and trust

HPAT members (HSAs and HCs) meet regularly to review indicators, solve problems and recognize good performance

DPATs (district staff only) meet regularly to review district performance, identify problems and take actions to solve problems

HPATs communicate with DPAT members and escalate bigger issues

HPATs use data to monitor SC performance RSW, paper based reports, reports received from district

DPAT members respond to alerts and use cStock dashboard to monitor SC performance and follow up

DPAT members linked to DTC / DHMT and escalates bigger problems

Regular supportive supervision by district and central level of EM activities

NPAT routinely looking at dashboard and following up with districts on performance and PA issues and recognizing good performance

All HSAs use cStock for reporting SOH every month

cStock and RSW are used for resupply process

HPAT / DPATs work as a team towards a common goal: collaborate, coordinate and communicate

Link between HPAT and DPAT by communicating problems

HPAT / DPATs do SC performance monitoring, identifying problems and taking actions

EM Operational

Resupply is regular and based on data

SC problems are quickly identified and action taken to address it

Reliable supply chain

Institutionalization / Sustainable of EM

Integration of EM into existing structures

. EM as part of initial CCM training

. EM is part of supervision checklists

. EM part of new staff training or orientation and they have access to SOPs and job aids

NPAT links district to central activities

DPATs should be part of district implementation plan

Process for continuous improvement of EM

HSA data routinely considered in drug budgeting

Software maintenance and upgrades

Sustainable and consistent product availability

Contextual: network coverage, electricity to charge mobile phones, transportation challenges, fuel allocation for supervision, variable partner support (difference in training approach effected length of training),

Mediating: commitment to CHSC across the board, partner roll out of EM

Appendix 8: List of Participants in Dissemination Workshop

Name of Participant	Organisation	Title
Boniface Chimphanga	HTSS(P)	Logistics Advisor
Moses Zawola	Nkhotakota DHO	Pharma-Tech
Humphreys Nsona	MOH-IMCI	Program Manager
Charles Yuma	PSI	Head of Program
Jeffrey Ligomeka	Zomba DHO	HMIS
Richard Martin	Nsanje DHO	Ag IMCI Coordinator
Blamu Makawi	Nsanje DHO	SHSA Supervisor
Dr Jonathan Chiwanda	Rumphi DHO	DMO
Mathew Ziba	Village Reach	Project Manager
Dr Dingase Kumwenda	Nsanje DHO	Medical Officer
Precious Zimba	Likoma DHO	DNO
Dr Bongani Chimkwapulo	Nkhatabay DHO	DMO
Dr David Kulapani	NENO DHO	DMO
Reuben Ligowe	Save the Children	MNCH Manager
Dr Katenga Kaunda	Chitipa DHO	DMO
Dr Alinafe Mbewe	Mzimba S.	DHO
David Chirwa	Chiradzulu DHO	SCO
Phillip Kamtenga	JSI	USAID|DELIVER Country Director
Bernard Fabre	JSI	USAID|DELIVER Deputy Director
Marie Geldof	D-tree	CD
Clifford Dedza	MOH-IMCI	Logistics Officer
Benjamin Banda	MOH-IMCI	Logistics Officer
Mildred Shieshia	JSI/SC4CCM	Regional Logistics Advisor
Yasmin Chandani	JSI/SC4CCM	Project Director
Jimmy Phiri	Kasungu DHO	CCO
Raphael Piringu	Mwanza DHO	DHO
Rumbani Mughogho	Kasungu DHO	EHO
Elizabeth Mkandawire	MOH-NMCP	Logistics Officer

Spray Kabwira	Kasungu DHO	SHSA Supervisor
Mc Authur Kapito	Salima DHO	CO
Alex Gondwe	Baobab Health	Director of Operations
Kondwani Kautsa	Kasungu DHO	Pharmacy Technician
Evelyn Zimba	USAID	MNCH Specialist
Khuliena Kabwere	Mulanje DHO	DHO
Emmanuel Mpoola	Mchinji DHO	Ag DHO
Amos Misomali	JSI/SC4CCM	Resident Logistics Advisor
Tina Musicha	JSI/SC4CCM	Finance & Administration Officer
Noel Chongo	JSI/SC4CCM	Administrative Assistant
Dr Chilima	CHSU	Deputy Director Preventive
Charles Chimenya	HTSS(P)	Pharmacist
Mr Albert Khuwi	HTSS(P)	Deputy Director
David Bagonza	HTSS(P)	SCDMA
Austine Omiunu	HTSS(P)	SCDMA
John Chipwanya	NMCP	Deputy Program Manager-Malaria
Samuel Chirwa	CHAI	Senior RMNCH Coordinator

Appendix 9: Stakeholder Recommendations and Action Plan

	Issue / Problem Definition	Recommendation / Action	Responsible	Action Timeline
District Level (DPATs)	Irregular DPAT meetings at district level	• Work with DHMT in each district level to identify district champions and strengthen DPAT leadership at district level	HTSS, through NPAT	Nov – Dec 2014
		• Promote integration of DPAT meetings with regular and already existing district level meetings where possible	HTSS, through NPAT	Nov – Dec 2014
		• Promote use of cStock dashboard and DPAT performance plan to monitor and manage district performance in EM	HTSS, through NPAT	Nov – Dec 2014
		• Broaden participation and ownership of EM across Malaria, FP, IMCI Program Coordinators, and Pharmacy staff	HTSS, through NPAT	Nov – Dec 2014
	Weaknesses in link between facility and district levels of the team	• Reinforce role of Cluster Supervisor in linking HPAT with the DPAT	DHMT, led by DHO	Nov – Dec 2014
		• Alternatively identify most feasible and regular resource-sustainable approach to strengthening this linkage	DHMT, led by DHO	Nov – Dec 2014
		• Mainstream HPAT facility supervision into district implementation plans for support as part of DPAT strengthening	DHMT, led by DHO	Jan 2015
		• Institute a clear induction plan for new staff that mainstreams EM into district induction package, including PAs	DHMT, led by DHO	Jan 2015
	DHMT orientation not done yet in some districts	• Conduct DHMT orientation in cStock + DPAT, incorporating zonal level officers	HTSS Pharmaceuticals	Nov 2014 – Feb 2015

NATIONAL LEVEL ACTION PLAN, 1/2				

	Issue / Problem Definition	Recommendation / Action	Responsible	Action Timeline
National Level (NPAT, Policy & Programs, 1/2)	Effective implementation of Action Plan and follow up	• Coordinate and manage dissemination of Endline Recommendations and Action Plan with all key stakeholders	HTSS Pharmaceuticals	Oct 2014
		• Follow up on progress around Action Plan implementation and manage process for results	HTSS Pharmaceutical	Dec 2014 – Feb 2015
		• Provide support and guidance to DPAT leadership and DHMTs, as required, towards	HTSS Pharmaceuticals	Nov 2014 – Feb 2015

		successful Action Plan implementation		
	Institutionalization, oversight, and policy direction for EM long term sustainability	• Implement practical steps aimed at integrating EM into standard MOH system structure and tools, such as routine program implementation monitoring and supervision checklists, new staff induction, SOPs and job aids, and basic CCM training package	HTSS Pharmaceuticals	Jan – Jun 2015
		• Champion value extraction from cStock + DPAT investments by promoting regular use of cStock data for program and supply chain system monitoring and management to support distribution planning, targeted supervision, quantification, and supply chain problem solving at community level	HTSS Pharmaceuticals	Dec 2014
		• Develop clear guidelines and protocols for effective management of product portfolio in cStock (product addition, deletion) to ensure continued relevance	HTSS Pharmaceuticals	Dec 2014

NATIONAL LEVEL ACTION PLAN, 2/2

	Issue / Problem Definition	Recommendation / Action	Responsible	Action Timeline
National Level (NPAT, Policy & Programs, 2/2)	Expand cStock functionality to support distribution planning	• Identify funding and upgrade cStock 'Resupply Quantities Required Tab' to activate it to support distribution planning	HTSS Pharmaceuticals	Nov – Dec 2014
		• Support stakeholder orientation on how the 'Resupply Quantities Required Tab' can be used to support product distribution planning	HTSS Pharmaceuticals	Jan – Mar 2015
	cStock continuity and permanent 'home'	• Identify funding to undertake reassessment of HIV Department and Airtel as potential cStock data hosting options for long term and advise MOH on risk-benefit balance for their decision making	HTSS Pharmaceuticals	Oct – Nov 2015
	Long term financing and building for leadership sustainability	• Continue to develop and nurture champions at all levels for leadership sustainability	HTSS Pharmaceuticals	Ongoing
		• Follow up progress on GFATM funding proposal and simultaneously identify medium-longer term funding options (inclusion in Sector Wide Approach (SWAp) budget; national health budget; long term strategic supply chain partner)	HTSS Pharmaceuticals	Oct 2014 – Jun 2015