

# Malawi

---

## Community Health Supply Chain Midline Evaluation Report

January to March 2013



GOVERNMENT OF MALAWI

MALARIA  
ALERT  
CENTRE 





# **Malawi**

## **Community Health Supply Chain Midline Evaluation Report**

January to March 2013

### **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 CCM. 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.

### **Recommended Citation**

SC4CCM. 2013. *Malawi Community Health Supply Chain Midline Assessment Report*. Arlington, Va.: SC4CCM.

Cover photo: Health surveillance assistants practice sending reports with cStock.



JSI Research & Training Institute, Inc.  
1616 Fort Myer Drive, 11th Floor  
Arlington, VA 22209 USA  
Phone: 703-528-7474  
Fax: 703-528-7480  
Internet: [www.jsi.com](http://www.jsi.com)

# Contents

Contents .....	i
Acronyms .....	iii
Executive Summary .....	v
Background .....	1
Summary of Baseline Results .....	1
Intervention Description .....	3
Purpose of the Midline Evaluation.....	5
Methodology .....	6
Results.....	11
Context.....	11
cStock .....	13
Enhanced Management (EM) – District Product Availability Teams .....	19
Efficient Product Transport (EPT).....	25
Comparing Supply Chain Performance in EM and EPT groups .....	28
Product Availability.....	31
Discussion .....	35
Theory of Change .....	36
Recommendations.....	39
Conclusion .....	41
Appendix A.....	43
Description of SC4CCM Theory of Change Model .....	43
Key components .....	43
Theory of Change Diagram .....	44
Appendix B: Core Indicators .....	45
Main SC4CCM Objective: (Ensure that) CHWs have usable and quality medicines available when needed for appropriate treatment of common childhood illnesses .....	45
Appendix C: Data Validation Workshop Participants .....	47
Enhanced Management Data Validation Workshop Participant List .....	47
Efficient Product Transport Data Validation Workshop Participant List.....	48
National Data Validation and Sustainability Workshop Participant List .....	49
References.....	51

## Figures

Figure 1: SC4CCM Interventions .....	4
Figure 2: Intervention and comparison districts.....	6
Figure 3: Partner supported CCM products over intervention period.....	12
Figure 4: Time taken to prepare and submit the cStock SOH report .....	17
Figure 5: Time table to complete the logistics form .....	17
Figure 6: Frequency and attendance at DPAT meetings reported by HSA supervisors .....	21
Figure 7: Attended a HF DPAT meeting in the last 3 months .....	22
Figure 8: Frequency of SOH reporting by HSAs using cStock .....	26
Figure 9: % of HSAs with a bicycle and the portion of those whose bicycles were functioning and non-functioning on day of survey .....	28
Figure 10: cStock reporting rates for EM vs. EPT districts, August 2011 to February 2013 .....	29
Figure 11: cStock reporting completeness rates for EM vs. EPT districts, August 2011 to February 2013.....	29
Figure 12: cStock average total lead times for EM vs. EPT districts, August 2011 to February 2013.....	30
Figure 13: cStock average lead time components for EM vs. EPT districts, August 2011 to February 2013.....	31
Figure 14: % HSAs with all 3 key CCM drugs in stock on day of survey by district, BL vs. ML.....	32
Figure 15: % HSAs in stock day of survey by product, BL vs. ML .....	33
Figure 16: % of HSAs in stock by product and intervention group.....	33

## Tables

Table 1: Sample Size by intervention group, BL and ML .....	7
Table 2: EM sample sizes .....	20
Table 3: EPT sample sizes .....	25
Table 4: Bicycle maintenance.....	27
Table 5: Difference-in-differences (DiD) regional results: EM and EPT groups .....	34

## Acronyms

ACT	Artemisinin-based Combination Therapy
BL	baseline
CCM	Community Case Management
CHAM	Christian Health Association of Malawi
CHW	Community Health Worker
DHMT	District Health Management Team
DHO	District Health Officer
DOV	day of visit
EHP	Essential Health Package
EM	Enhanced Management (Intervention)
EPT	Efficient Product Transport (Intervention)
FGD	focus group discussion
HC	Health Center
HF	Health Facility (includes both health centers and district hospitals)
HSA	Health Surveillance Assistant
IMCI	Integrated Management of Childhood Illnesses
JSI	JSI Research & Training Institute, Inc.
KII	Key Informant Interviews
LA	Lumefantrine Artemether
LIAT	Logistics Indicator Assessment Tool
LMIS	Logistics Management Information System
LSAT	Logistics System Assessment Tool
MAC	Malaria Alert Center
MDHS	Malawi Demographic and Health Survey
ML	midline
NGOs	Non-Governmental Organizations
NI	non-intervention
ORS	Oral Rehydration Solution
RMS	Regional Medical Stores
RSW	resupply worksheet
SC	supply chain
SC4CCM	Supply Chains for Community Case Management

## Malawi Community Health Supply Chain Midline Evaluation Report

SOH	stock on hand
TOC	Theory of Change
UNICEF	United Nations Children’s Fund
WHO	World Health Organization



## Executive Summary

The Improving Supply Chains for Community Case Management of Pneumonia and Other Common Diseases of Childhood (SC4CCM) project, funded by the Bill and Melinda Gates Foundation and implemented by JSI Research and Training Institute, Inc. (JSI R&T), works to identify, demonstrate, and institutionalize supply chain management (SCM) practices that improve the availability and use of selected essential health products in community-based programs. In Malawi, SC4CCM's objective is to collaborate with the Ministry of Health (MOH) and its community case management (CCM) and supply chain partners to test new supply chain innovations and draw lessons on how to significantly and sustainably improve product availability at the community level and therefore enhance program effectiveness in reaching desired health program goals and outcomes.

In 2010, SC4CCM in partnership with MOH subcontracted the Malaria Alert Center (MAC) in Malawi to conduct a baseline assessment of the community health supply chain. Based on the analysis of the baseline assessment results and consultations in country, an intervention strategy was designed for improving community health supply chains based on the following hypotheses:

- 1. Creating a customer service oriented supply chain by developing teams that have a sense of urgency around maintaining consistent product availability for HSA commodities, empowering teams by improving data visibility and decision making authority/capacity, and recognizing SC performance and achievements by teams and individuals will significantly improve product availability at the HSA level.*
- 2. Addressing transportation and data visibility challenges between resupply points and HSAs will significantly improve product availability at the HSA level.*

These hypotheses were translated into two interventions for significantly improving product availability at the HSA level:

- Enhanced Management (EM)**, which focused on developing a team-based, goal focused approach to managing community level supply chain using performance reports from cStock, and
- Efficient Product Transport (EPT)**, which focused on improving efficiency of product collection by imparting bicycle maintenance skills to HSAs to be able to fix minor problems on their bicycles to facilitate mobility and prolong overall bicycle useful life span and flexible inventory control system.

Cross-cutting these interventions was a common solution called **cStock**, an SMS-based reporting and resupply system, which aimed at making community level supply chain performance data significantly more visible in order to support timely monitoring, problem solving, and evidence-based decision making.

The midline evaluation was conducted in February 2013, 18 months after the implementation of the pilot. The objectives of the evaluation were 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

## Malawi Community Health Supply Chain Midline Evaluation Report

SC practices and support the 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
  - reporting rates were consistently above 80% over the 5 months leading up to the survey in both groups
- The EM intervention – which combines cStock and DPATs – showed the most promising improvements in supply chain practices and processes, such as reporting rates and lead times
- The EPT intervention was not as effective as EM, and findings showed the intervention did not take off as expected.
  - The continuous review inventory control mechanism was not implemented by HSAs as this was perceived as burdensome for both HC staff and HSAs.
  - Bicycle maintenance training did not achieve the intended impact as HSAs were not any more likely to maintain their bicycles or have better functioning bicycles compared to other districts.

Participants at the National Data Validation Workshop recommended the scale-up of the EM package, with a few modifications based on lessons learned over the intervention period and feedback from district staff. It was recommended that the flexible inventory control system and the bicycle maintenance training be discontinued due to a lack of evidence that these impacted the performance of the supply chain. The recommendation was based on the difference in supply chain performance levels between EM and EPT groups.

The results of this evaluation suggest that the EM approach if implemented well has the potential to strengthen the community health supply chain and improve product availability of essential medicines in the long term and should be considered a priority in efforts to achieve MGD 4 goals and Malawi's specific plans to improve child health outcomes nationally.

## Background

The Improving Supply Chains for Community Case Management of Pneumonia and Other Common Diseases of Childhood (SC4CCM) project, funded by the Bill and Melinda Gates Foundation and implemented by JSI Research and Training Institute Inc. (JSI R&T), works to identify, demonstrate, and institutionalize supply chain management (SCM) practices that improve the availability and use of selected essential health products in community-based programs. While there is a lack of rigorous evidence there is widespread belief based on anecdotal evidence that community health programs are hampered by ineffective supply chains, that there could be better ways to ensure product availability within these programs, and that there is the hope among stakeholders that solving such supply constraints may yield significant improvements in programs' effectiveness, scale and impact. The project goal therefore is demonstrating, in three sub-Saharan African countries, that it is possible to overcome such supply chain constraints to effective community-based treatment of common diseases of childhood at scale and significantly contribute to effective program implementation and achievement of desired health goals and outcomes.

In Malawi, the SC4CCM's objective is to collaborate with the Ministry of Health (MOH) and its community case management (CCM) and supply chain partners to test new supply chain innovations and draw lessons on how to significantly and sustainably improve product availability at the community level, and scale up such proven supply chain innovative practices nationally so as to influence national level indicators. The project believes that learning how to achieve significant improvements in supply chains for CCM and other products managed at the community level will lead to significant improvements in product availability for serving clients at the community level, and therefore enhance programme effectiveness in reaching desired health program goals and outcomes.

In 2010, SC4CCM in partnership with MOH subcontracted the Malaria Alert Center (MAC) in Malawi, to conduct a baseline assessment of the community health supply chain. Results from the baseline were validated by health workers at all levels of the system and then used to identify chronic weaknesses in the community health supply chain. Intervention strategies were designed based on the premise that improvements needed to result in significant rather than incremental change, and needed to be sustainable from a resource perspective at scale. The strategies evolved through an interactive process, where the project consulted with local level implementers and concurrently performed analyses on the sustainability of the approach.

### Summary of Baseline Results

A baseline assessment of the supply chain in Malawi was carried out from April to June 2010 to examine product availability at the lowest levels of the system. SC4CCM found that 27% of HSAs who manage health products had all four tracer medicines (cotrimoxazole, LA1x6, LA2x6, ORS) in stock on the day of visit. Only one out of three regional medical stores and 47% of resupply points had these same three tracer drugs in stock on the day of visit. However, product availability varied considerably by district and could not be attributed to partner support, suggesting that districts with good leadership and motivation could improve product availability.

## Malawi Community Health Supply Chain Midline Evaluation Report

The knowledge and capacity of community health workers and staff at resupply points also varied greatly. Fifty-nine percent of HSAs and about 75% of resupply staff reported being trained on supply chain management. While over 80% of HSAs submitted reporting forms, there was variation in forms used and only 43% used a form that included all the necessary logistics data. In 14% of health centers, HSA data were reported separately from the HF data to the district level and others aggregated the data or didn't include HSA data at all.

In order to receive these supplies from a resupply point, 80% of HSAs depended on a bike and 11% on foot. Most HSAs traveled on earth roads. On average, HSAs were about an hour by car away from their resupply point so transportation took much longer if by bike or foot. Transportation was cited as a large challenge with HSAs reporting, "the transport was always broken," "there was no transport available," "too long to reach the supply point," and "difficulties carrying supplies."

HSAs reported moderate levels of supervision and feedback regarding supply chain management, with variability across districts. 83.6% of HSAs reported receiving a supervisory visit in the three months preceding the survey, however supply chain management was only included about half the time. It was noted that there was a lack of an incentive system for HSAs.

From this assessment, the key findings were that there was an inadequate availability of CCM products throughout the national pipeline. There also was limited data visibility which resulted in poor forecasting and pipeline monitoring. This also weakened the MOH's ability to advocate for increased funding to cover CCM. Routine transportation of products between resupply points and HSAs was observed as both burdensome and time consuming with unreliable transportation options. Finally, there was no formal recognition and incentive system around supply chain management in place to drive performance of HSAs, and supervision around supply chain issues was low.

## Intervention Description

Based on the analysis of the baseline assessment results and consultations in country, an intervention strategy was designed for improving community health supply chains based on the following hypotheses.

1. *Creating a customer service oriented supply chain by developing teams that have a sense of urgency around maintaining consistent product availability for HSA commodities, empowering teams by improving data visibility and decision making authority/capacity, and recognizing SC performance and achievements by teams and individuals will significantly improve product availability at the HSA level.*
2. *Addressing transportation and data visibility challenges between resupply points and HSAs will significantly improve product availability at the HSA level.*

These hypotheses have been translated into two interventions for significantly improving product availability at the HSA level:

The first intervention takes a strategic approach of focusing on management practices and thus is named ***Enhanced Management of Community Health Products (EM)***. The EM intervention aims to create a customer service oriented supply chain, by developing teams that have a sense of urgency around maintaining consistent product availability for HSAs commodities, and empowering them with data and decision making authority to significantly improve product availability at the HSA level.

This intervention is based on the premise that a synergistic team approach for improving product availability will have greater outputs than what individuals could achieve alone. The intervention focuses on:

1. Promoting and fostering a team vision and commitment to community health product availability among MOH staff at all levels of the product supply chain.
2. Promoting supply chain goal setting, performance monitoring, and recognition of superior performance to enhance effective team performance.
3. Improving communication and collaboration among team members bound by a common goal.
4. Promoting the use of data to guide timely problem solving and decision making at district and lower levels to solve supply chain issues.

The second intervention takes a strategic approach of focusing on identifying improvements in efficiency, specifically around transport and use of the HSA's time, and is named ***Efficient Product Transport of Community Health Products (EPT)***. The EPT intervention addresses transportation and data visibility challenges between resupply points and HSAs, and is aimed at significantly improving product availability at the HSA level with a minimal expenditure of time and effort.

This intervention aims to minimize travel time by HSAs purely for the purposes of collecting supplies, simplifies and automates the resupply process, lessens the volumes that must be transported and enhances the reliability of bicycles. Following are the three key components to achieving an efficient transport system for HSAs:

A continuous review inventory control system that is flexible and aligned to the routines of the HSAs; allowing HSAs to collect smaller more frequent top-up orders during their scheduled visits to reduce the requirement for the HSA to make a special trip to pick up products.

An SMS-based reporting and resupply system (cStock) that calculates resupply quantities automatically for health centers and allows for data to be available in advance of the HSA arriving to pick up products.

## Malawi Community Health Supply Chain Midline Evaluation Report

Regular bicycle maintenance performed by HSAs that reduces the break downs and repairs needed to keep the bicycles functioning, resulting in more consistent and reliable transport. HSAs are trained in the skills and provided with the tools necessary to maintain their bicycles.

Both interventions include improved data visibility as the cornerstone of each strategy, albeit applied in different ways through the use of cStock. This focus on data visibility recognizes that improved data for SC decision making is a best practice in supply chain management, without which significant improvements in SC performance and product availability may not be possible to achieve.

*cStock* is an SMS-based reporting and resupply system (cStock) that calculates resupply quantities automatically for health centers and allows data to be available in advance of the HSA arriving to pick up products.

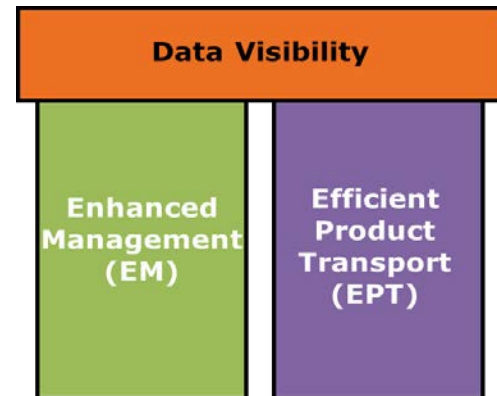
Deploying a system to improve data visibility as a core component within each of the above interventions recognizes the importance of providing decision makers at higher levels of the system with more accurate and timely data with which to make supply chain decisions, and facilitating the decision making process by translating data into performance reports that can readily be used for effective decisions and actions.

Examples of the kinds of decisions that have been enhanced by having better, timelier data available include:

- Automatic calculation of resupply quantities and data available in advance of the HSA coming to collect supplies reduces the wait time and burden on the health center staff who can organize supplies ahead of the HSA arriving
- Timely ability to identify and respond to emergency stock levels and stockouts at the health center or HSA levels
- Development of more comprehensive quantification for CCM and other community health level products, using calculated consumption data from the HSA level.

These interventions were formally launched by the project, in collaboration with Malawi's MOH, in June 2011. Each approach was launched in three districts with cStock implemented in all six districts. The EM approach was implemented in Nsanje, Kasungu, and Nkhatakota while the EPT approach was implemented in Nkhata Bay, Machinga, and Mulanje.

**Figure 1: SC4CCM Interventions**



## Purpose of the Midline Evaluation

SC4CCM was built around the concept of moving evidence into practice, so M&E has been integrated as a key component of project activities from the outset. The midline evaluation was conducted to validate the Theory of Change framework (Appendix A) by revealing the extent to which it has been realized, therefore evaluating the country-specific intervention strategy. By comparing baseline and midline community level product availability data the project assessed the impact of the two supply chain interventions (EM and EPT) against a group of 4 comparison districts. The evaluation also provides evidence about cStock as an effective system for making community supply chain data visible and a contributing factor to improved product availability in Malawi. Finally, the midline evaluation provides rigorous evidence around the interventions tested by SC4CCM in order to both support the MOH of Malawi to take action towards scaling up promising activities, and for consideration by country programs outside of Malawi that seek to improve supply chains for CCM.

### **Objectives of Midline Evaluation**

1. Assess & compare the impact of the two intervention groups (EM and EPT) on improving supply chain performance at the community level against a group of 4 baseline, but non-intervention districts
2. Provide evidence about cStock as an effective system for making community supply chain data more visible
3. Provide evidence around the interventions tested by SC4CCM to identify successful SC practices and support the MOH of Malawi to identify and take action towards scaling up promising activities.

### **Primary Outcomes Measured**

The midline evaluation sought to prove the following hypotheses related to the project's Theory of Change (TOC) Framework (Appendix A):

- Achieving sufficient supplies of essential CCM products at the community level requires all of the following preconditions:
  - Necessary, usable, quality CCM products are available at CHW resupply point/s
  - CHWs (HSAs), or the persons responsible for CCM resupply, know how, where, what, when and how much of each product to resupply and act as needed
  - Goods are routinely transported between resupply points and CHWs
  - CHWs (HSAs) have adequate storage: correct conditions, security and adequate space
  - CHWs (HSAs) are motivated to perform their roles in the CCM supply chain
- Obstacles to the above preconditions can be overcome using a combination of known best practices and cutting edge innovations that are practical to implement at scale in Malawi.
- Improvements made in the above preconditions will lead to improved CCM product availability as a consequence.

The core indicators for the project are included in Appendix B.

## Methodology

A combination of qualitative and quantitative evaluation methods were used at midline to measure the impact of interventions on key supply chain indicators, and gather evidence to identify the most promising interventions. Evaluation tools developed by JSI under the first USAID | DELIVER PROJECT, and validated through extensive use in a wide variety of countries worldwide, were tailored for the SC4CCM data requirements.

## Qualitative

### **Logistics System Assessment Tool (LSAT) and Key Informant Interviews (KII)**

One qualitative instrument used is called the Logistics System Assessment Tool (LSAT). The LSAT is normally a two day group discussion covering all areas of a logistics system, with questions that can be scored and tracked over time as indicators. For the purpose of this midline, the LSAT tool was adapted to a one day workshop with key informants focusing on central level functions that directly affect the supply chain for CCM commodities. Topics included quantification, procurement and financing of CCM commodities. Additional qualitative data was collected from stakeholders through key informant interviews on the same topics.

### **FGDs**

Focus group discussions (FGDs) were conducted with primarily lower level staff to better understand views on the impact of SC4CCM interventions on product availability and SC performance, the design of interventions, implementation, and perceptions of outcomes and elements recommended for scale up. The FGDs collected qualitative information around community supply chain data visibility and use, with particular focus on contributions made by the cStock system. FGDs in particular gathered views on the EM intervention and achievements made by District Product Availability Teams, as well as lessons learned about the intervention.

Two FGDs of 6-10 participants per intervention district were held with staff from 3-4 HFs outside the LIAT sample. One FGD per district included only HSAs (1 male and 1 female per HF), and the other FGD included HF staff handling CCM products (HSA Supervisors, Drug Store In-Charge / HF In-Charge).

## Quantitative

### **Logistics Indicators Assessment Tool (LIAT)**

The Logistics Indicators Assessment Tool (LIAT) was the main quantitative tool used at midline. The LIAT is a proven tool for assessing stock status and other quantifiable aspects

**Figure 2: Intervention and comparison districts**





## Malawi Community Health Supply Chain Midline Evaluation Report

of a supply chain. It was modified to focus on community level supply chain issues, the Malawian context and to gather data specific to the intervention design. LIAT forms also provided the basis of regular project monitoring conducted by in-country staff between baseline and midline evaluations. Data to measure core indicators (Appendix B) were collected by the LIAT through structured interviews with HSAs, and with health facility and/or warehouse staff at all levels of the system. The data collection included physically counting the amount of key CCM products kept at each level of the system (including stock kept by the HSAs), storage conditions, and certain aspects of record keeping and reporting.

LIAT data were collected in January 2013, one year and six months after interventions launched. Data collection forms were formatted to a web-based program called Magpi (formally EpiSurveyor) and loaded onto Nokia e71 and e63 smart phones. Forms were pre-tested, updated and re-loaded for the survey. Data were uploaded directly from phones to the Magpi database on a daily basis, eliminating the need for paper questionnaires and streamlining the data entry process.

SC4CCM worked with a local evaluation partner in Malawi, the Malaria Alert Center (MAC), to improve efficiency and help build local ownership and capacity. The role of the local partner was to oversee the LIAT fieldwork and conduct the FGDs.

The same regions and districts sampled purposefully for the baseline were visited for the midline (Figure 2). Criteria for district selection included: presence of a range of CCM partners and interventions, including partners with whom SC4CCM would work closely; and appropriate geographic, socioeconomic, and cultural variation. For each district the same health centers were revisited, and HSAs were selected randomly from facility rosters only including those found in hard to reach areas and managing health products. The total sample size per level and intervention were as follows for baseline and midline:

**Table 1: Sample Size by intervention group, BL and ML**

	EPT		EM		NI		Total	
	Machinga, Nkhatabay, Mulanje		Nkhotakota, Nsanje, Kasungu		Zomba, Ntchisi, Salima, Mzimba N.			
	BL	ML	BL	ML	BL	ML	BL	ML
District	3	3	3	3	4	4	10	10
Health Center	26	25	25	23	26	28	77	76
HSAs	83	78	81	81	84	90	248	249

## Analysis

### **Quantitative Data**

Quantitative data from the LIAT survey and from the cStock system were analyzed to understand changes in product availability and other key supply chain performance indicators, and investigate whether changes could be attributed to the interventions tested.

CCM product availability on the day of visit was analyzed both for individual products (cotrimoxazole 480 mg tablets, LA 1 x 6 tablets (ACT), LA 2 x 6 tablets (ACT), ORS sachets, and zinc 20mg tablets) and as a bundle (e.g. “all 5” products) The core indicator “all 5 products in stock” is the ideal for HSAs in Malawi, so this is the ultimate measure of success for the CCM supply chain reaching down to the community level. However, a realistic alternate to this is “all 3 products in stock” (cotrimoxazole, either LA, and ORS) for two main reasons. First, in Malawi the formulation for LA can be used interchangeably (meaning LA 1x6 can be doubled for large children, or LA 2X6 cut in half for smaller children). Furthermore, zinc was not available in 2010 for the baseline, so the “all 3 in stock” indicator is necessary to compare performance over time. Several non-CCM tracer products, such as those used for family planning services, were included in baseline and midline for comparison analysis.

Using a difference-in-difference design, data were analyzed to understand if any portion of change in product availability over the intervention period was attributable to the interventions by comparing baseline to midline figures between the intervention and non-intervention groups. Districts chosen at the beginning the project were matched into intervention groups as much as possible in terms of geographical and demographic characteristics and other external dimensions; this was in an effort to make the groups as similar as possible to control for outside influences and ensure the product availability at baseline was approximately the same point in both groups. As a result, any total change in product availability, less natural changes over time, minus change attributable to external factors (that also appeared in the non-intervention group), were considered as the change attributable to SC4CCM interventions.

New indicators were developed for the midline evaluation, specifically for each intervention group to understand how well the intervention was implemented and to identify any changes that occurred from the original design. Indicators that applied to both groups (e.g. data visibility indicators) were compared to each other and to non-intervention districts at midline, using caution in the absence of baseline measures. One example was lead time; because no baseline measure exists for lead time, and the indicator was calculated using data from the SMS system; the project compared lead time across intervention and non-intervention groups, but did not compare to baseline.

### **Qualitative Data**

SC4CCM systematically analyzed qualitative data from the midline evaluation activities. For focus groups, notes-based analysis was used immediately following each session. Results from multiple focus groups were synthesized into narratives that link directly to project indicators and highlight discussions pertinent to successful implementation. Focus groups were used as appropriate to further explore or clarify aspects of indicators that are normally collected quantitatively.

## Data Validation Workshops

Data Validation Workshops were conducted with stakeholders from all levels of the community health supply chain. During these workshops, participants explored the results from the evaluation to validate and provide additional interpretations of the results. Then, based on the results and their experiences with the intervention, they identified an intervention package for scale up. The additional interpretations of the results are included in this report to add depth to the data. Three data validation workshops were conducted; one for each intervention group that explored the specifics of the intervention and then one national workshop that, in which results and recommendations from the two previous workshops were summarized and used to develop a standard intervention package recommended for scale up across the country.

## Limitations

The following are limitations that of the midline evaluation; the project believes that none were significant:

- Stock status and storage conditions for CHAM facilities included in BL but not ML, since CHAM do not hold products for HSAs.
  - Storage and stock status data collected at midline from District facilities, the normal resupply point for HSAs associated with CHAM facilities.
- Rainy season caused geographical or physical challenges that necessitated resampling of some HSAs.
- Missing data and some unexplained issues in data/sample possibly due to evaluation partner data collectors rushing to finish data collection towards the end of the evaluation.
- Some District IMCI Coordinators, Pharmacy Technicians and HSAs were away attending training during the time of data collection in their respective districts, resulting in rescheduled appointments.

## Tracer Product List

The following products were used as tracer indicator products during the evaluation:

1. *cotrimoxazole 480mg (tablets)*
2. *LA 1x6 (tablets)*
3. *LA 2X6 (tablets)*
4. *ORS (sachets)*
5. *zinc 20 mg (tablets)*
6. *paracetamol 500 mg (tablets)*
7. *DMPA (vials)*
8. *tetracycline eye ointment (tubes )*
9. *male condoms (pieces)*
10. *female condoms (pieces)*
11. *Unigold HIV tests (kits)*
12. *Determine HIV tests (kits)*



## Results

The following results are presented by first showing data specific to the implementation of the different components of the intervention strategy – cStock, enhanced management (EM) and efficient product transport (EPT). Although cStock was an integral element of both interventions, some results are presented separately to demonstrate its ability to meet our objective of creating a robust, easy to use system that has tremendously improved data visibility as per available evidence. However, aspects relating to use of cStock as part of the EM and EPT interventions are included in discussion of those interventions as well. Finally, results from the EM and EPT interventions are compared in relation to supply chain performance – this includes reporting rates, lead times and ultimately product availability.

Data presented here are a combination of survey data, focus group discussions, analysis of cStock data and feedback during data validation workshops in country.

### Context

Key informant interviews and the LSAT were used to collect data on the contextual changes that occurred in Malawi and in the CCM program during the course of the intervention period. In reviewing the results of the midline evaluation it is important to understand the context and factors that may have influenced the results presented here.

Between the baseline assessment in 2010 and the midline evaluation in 2013 there was a significant scale up of CCM with the overall number of functional village clinics more than doubling. At baseline, because scale up was incomplete, only 139 of the 249 HSAs sampled actually managed health products at the time of the survey, while the full midline sample of 249 HSAs managed health products.

At baseline very few partners were procuring CCM products, and most HSAs received their products through the MOH Central Medical Stores (CMS). By the start of actual intervention testing, the CMS was experiencing challenges with respect to consistently providing sufficient health products to facilities where HSAs could continue to draw supplies to meet demand in their catchment areas. This prompted some partners to seriously consider alternative ways of assuring product availability at community level, in order to ensure that CCM Program delivery was not compromised. As a result, parallel supply chains were set up by partners in a majority of the evaluation districts that either directly supplied HSAs or pre-packed quantities for individual HSAs that were delivered to health centers for pick up. In all cases where parallel supply chains were established, neither individual HSA-specific consumption data nor cStock was used to calculate resupply quantities. Instead, partner organizations derived its own mechanism/formula of determining re-supply quantities for HSAs, largely driven by reported case data from previous months.

While this direct partner distribution had a significant impact on increasing product availability, the health system relied heavily on these short term projects and therefore increases in product availability were not sustainable. In addition, it was also observed that product allocation was not very efficient resulting in stock imbalances. Evidence in SC4CCM/partner overlap districts showed that the parallel supply chains' product allocation mechanism to HSAs resulted in either a lot of over-supply (overstocking) in some districts or under-supply in others in many cases. As

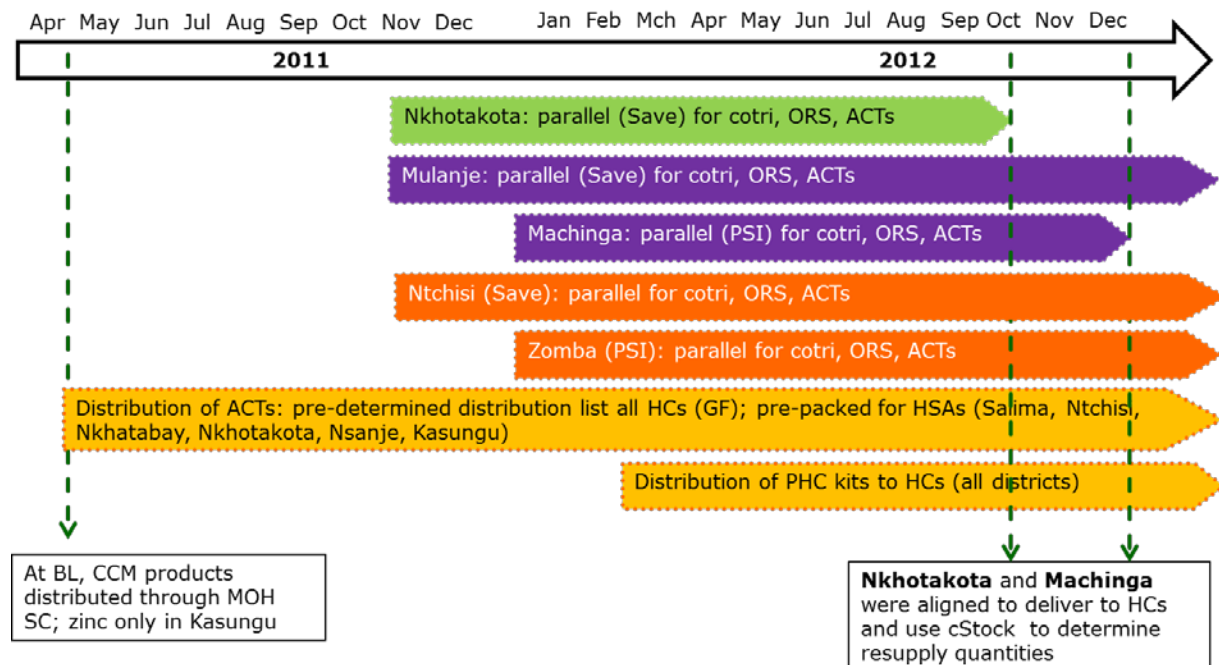
## Malawi Community Health Supply Chain Midline Evaluation Report

these parallel systems masked the weakness in the MOH system (though not intentional by design) and the effect of the SC4CCM interventions on product availability, the project worked with MOH and partners to align the supply chains back to the MOH system by having partners deliver products to the health centers and have HSAs resupplied from these facilities based on cStock calculated orders/re-supply quantities, which were reflective of HSAs' specific consumption needs in their catchment areas. These efforts were mostly successful by the time of the midline evaluation. Parallel supply chains remained in only three of the 10 evaluation districts for most CCM products: one EPT district, Mulanje, and two non-intervention districts, Ntchisi and Zomba, and in six districts for ACTs: one EPT district Nkhatabay, all EM districts Nkhotakota, Nsanje, Kasungu, and two non-intervention districts, Salima and Ntchisi.

Another factor that affected product availability was the introduction of Primary Health Care (PHC) kits in January 2012, again, in response to challenges in national level product availability from CMS as CMS was undergoing reforms into a trust. These PHC kits contained a standard quantity of key essential medicines and were delivered directly to health centers. While kits were only intended to cover HC needs, it was at the discretion of the health center whether they used these medicines to resupply HSAs; regardless, distribution of kits resulted in higher overall availability of products in the system. As at midline evaluation, the general understanding is that final distribution of the PHC Kits will take place in September 2013, and no extension is expected beyond September.

The following diagram outlines the partner supported supply chains over the intervention period.

**Figure 3: Partner supported CCM products over intervention period**



Other contextual changes worth noting that were outside the CCM program control but did impact on implementation of this intervention were the irregularity of the fuel supply in the country, which created significant challenges with the timing of intervention training/roll out, and also product distribution and supportive supervision to the re-supply points. In addition, the

## Malawi Community Health Supply Chain Midline Evaluation Report

economic crisis had significantly affected the buying power of available drug budget at district level, resulting in less available effective funding for procurement and district purchasing.

### cStock

At baseline only 43% of HSAs responded that they submitted a report to HCs that had all the necessary logistics data. Only 14% of HF staff reported HSA data separately when submitting their reports to districts, which translates to low visibility of HSA data at higher levels of the supply chain. In designing cStock, SC4CCM's objective was to create a system that provides real-time, actionable HSA logistics data for managers and stakeholders to coordinate, plan, and identify solutions to better meet customer needs in a timely manner. To understand whether cStock met this objective and how it performs related to established and accepted evaluation factors for eHealth tools, we adapted a framework developed by Khoja-Durrani-Scott, et. al. to assess cStock. The Khoja-Durrani-Scott framework describes four stages and SC4CCM worked through the three initial stages by the time of the midline evaluation: development, implementation, and integration. The last stage, sustained operation, will be included in the project's endline assessment in 2014, focusing on scale up and sustainability.

The factors considered relevant in this discussion are taken primarily from the technology, behavioral and sociotechnical outcome themes and include:

- Well-designed software
- Interoperability
- Affordability / cost minimization
- Relevance to existing, changing and growing needs
- Environmental viability
- Communications flow
- User-friendliness and acceptance
- Efficiency
- Accuracy

SC4CCM addressed several of the factors directly through the design and development stage. cStock was conceptualized based on an existing gap in visibility of logistics data from the community level, which establishes relevance to and ability to address an existing and growing need. Reporting rates in cStock have steadily increased since the system's implementation and have been consistently above 80% since October 2012. To ensure well-designed software SC4CCM considered the experience of other similar systems (e.g. ILS Gateway in Tanzania) when developing cStock so as not to make the same mistakes. The project also had a user-centered, interactive approach to system development that included a second development phase during the pilot period to get user input and upgrade the system to meet their needs. To ensure reliability of system outputs, project staff systematically tested and refined calculations made by cStock to certify standardization and accuracy based on inputs. An open source design gives cStock interoperability with other relevant and appropriate e-systems, though this functionality has not been tested to date. Finally, in terms of affordability and cost minimization, the project designed cStock with the understanding that HSAs and HF staff would use their personal phones

## Malawi Community Health Supply Chain Midline Evaluation Report

for sending messages, minimizing the cost associated with providing phones, but would not expect staff to shoulder the cost of sending messages themselves, and moved this function to a higher level by setting up a toll free line with each of the country's two major network carriers.

The following sections look at other themes from the Khoja framework in light of midline evaluation results.

### **Environmental viability: Taking advantage of increased presence of mobile phones in Malawi**

In designing cStock, the MOH and the project capitalized on an environment where most HSAs own mobile phones to simplify data transmission, improve reporting rates and data visibility. The challenges associated with reporting were lack of printed report forms and challenges with transport. With a high level of phone ownership at baseline (89% of HSAs owned a cell phone in 2010) the use of a SMS system addressed both these challenges by eliminating the need for printed forms and the need to travel to submit the report.

Phone ownership continued to increase over the intervention period. At the midline survey 99% of HSAs and HF staff interviewed had mobile phones, and 80% of HSAs and 80% of HF staff had network coverage at their place of work all the time. With the exception of 1 HF drug store in charge, all HSAs and HF staff responded that they had network at least sometimes. 81% of HSAs reported that they have access to a phone charger all the time, and 91% have access at least sometimes. Less than a quarter of HSAs reported challenges using cStock, and most of these did not relate to the system itself but to the basics of mobile phone usage. Of those who had any trouble (n=38), the major challenge mentioned was: network not always available (42%), followed by error messages (21%), not able to send messages with Airtel because of no credit (8%), repeated nags (5%), and no access to a phone charger (3%).

FGD findings corroborated survey data with the majority reporting few challenges associated with the implementing the technology. Barriers to using cStock effectively were discussed during the FGDs, such as network outages and keeping phones charged, and some showed initiative in addressing these challenges.

*“It also depends on the site, there could be no electricity or poor network, so this also affects in sending the cStock in time.” – HSA, Machinga*

*“We walk long distances to charge our phones.” – HSA, Nkhotakota*

*“We even climb a hill or a tree to find network.” – HSA, Nkhatabay*

In designing cStock the fact that computers and internet were available at district level was considered and the data are displayed on a dashboard for use by district coordinators and pharmacy staff to monitor the community level supply chain. A majority of District IMCI Coordinators (5 out of 6) reported that the cStock website takes one minute or less to load. None of the six reported that they were discouraged from using cStock because of page loading time.



### **Communications flow: Easier exchange of information and coordination between different levels due to increased visibility of data.**

In FGDs, HF participants shared their perception that demand for products at the facility level is communicated to higher levels (e.g. health center, district, coordinator) through cStock. But they perceived the overall function of cStock as forming a linkage from the HSAs to the health center. In their view, this linkage facilitates communication between levels and to more HSAs, ultimately helping to reduce mortality in child under five:

*“... it’s a linkage between the HSAs and the supervisors, even the in-charge, because when the products are ready we just send the message to let them know that the drugs are ready. While before it was hard to reach every HSA.” – HF in-charge, Machinga*

HSAs in the FGDs show they understand that through cStock, demand for products is recorded and communicated throughout the supply chain. The HSAs described the ways in which cStock has resulted in reducing unwanted trips to the HF, coming back to their communities “empty handed”, and that they perceived cStock increases incentives for health facility staff to ensure product availability for HSAs. Respondents expressed perceptions that cStock can increase the ability to monitor and communicate information on product usage, and increases accountability and transparency.

*“Data collected will help all of us, government and other donors will know our drugs consumption and plan accordingly.” – HSA, Kasungu*

However, some HSA participants alluded to breakdowns in working relationships, suggesting mistrust and lack of effective communication between the HSA and the supervisor. They specifically discussed times when supervisors do not respond to HSAs to let them know status of product availability.

### **User-friendliness and Acceptance**

FGDs revealed that HSAs and HF staff perceive cStock as easy to use. They noted a lack of challenges in the mechanics of sending messages. HSAs talked positively about cStock reminders (reporting reminders are sent automatically from cStock via SMS every month) as being useful to them for remembering to submit reports and HF participants noted that cStock alerts are beneficial in notifying them of late reporting from HSAs (cStock sends an SMS to the HSA supervisor when HSAs they supervise have not reported by the expected date).

### **Requesting / reporting**

cStock has become the primary means for HSAs to order or request health products from their resupply point with 94% of HSAs in cStock districts (both EM and EPT, n=159 ) using cStock for requesting products. Non-intervention districts showed much less consistency in the way products were requested; 52% of HSAs (n=90) reporting that they use a request form or other document, and 48% use Form 1A (which is primarily a reporting form not a request form) to request health products.

## Malawi Community Health Supply Chain Midline Evaluation Report

Reporting of logistics information by HSAs through the use of Form 1A (paper based report) is now very high, with 99.8% (compared to 42% at baseline) of HSAs reporting that they submit Form 1A, which contains logistics data in addition to service data. It should be noted that cStock was not intended to replace Form 1A as this form also contains other important programmatic data. In FGDs participants indicated that both cStock and the paper form are necessary as they provided different information:

*“cStock is good because it has reduced the mortality rates of under-five because it makes the HSA to have the drugs available all the time, while paper work help us to know the performance of the HSA.” – HSA supervisor, Machinga*

### **Resupply**

92% of Drug Store in Charges in intervention districts (n=48) reported using cStock to determine the quantities to resupply to HSAs, widely preferring cStock calculations over other data sources.

In FGDs, HF participants’ discussed the way that they make decisions about the amount of products that they give to each HSA which revealed that supervisors take multiple factors into account, such as cStock’s calculation, availability of drugs at the health facility, assessment of HSA performance and drug distribution habits, HSA under stocked status, data from paper forms, and population size. HF staff also noted that the quantity of drugs that cStock calculates per HSA can be discrepant with the way that drugs are packaged, making it difficult to distribute drugs in accordance with cStock calculation. Overall, HF participants said that cStock enabled them to avoid inefficiencies of distributing products without sufficient need.

HSAs indicated their appreciation for greater transparency in product distribution, which they perceived as resulting from cStock due to its mechanized method of making calculations and the documentation of the transactions. However some HSAs also discussed their perception that supervisors and/or in-charges do not provide them with the quantity of products that cStock has calculated, mainly attributing this to product shortages at the health facility. These shortages lead supervisors/in-charges to “trim” the quantity recommended by cStock in order for the available stock to be shared by multiple HSAs:

*“...when we get to the health facility we are told that drugs are not enough, therefore to give you what cStock has calculated is hard, hence we are given part of the drugs, each HSA has to carry something back to the village clinic.” – HSA Kasungu*

### **Performance Monitoring / Feedback**

HSAs during FGDs talked about cStock reminder messages as motivating them to carry out their supply chain activities, encouraging them to improve performance. HSAs indicated that the immediacy of the feedback that they receive is a motivating attribute of cStock.

*“I feel very happy whenever I am sending SMS to cStock because, I receive feedback right away and because of this I am motivated.” – HSA, Machinga*

*“... as for now every month end they send on the dashboard, the performance rate for HSA, hence we are happy and motivated to work extra hard...it is helping.” – HSA, Nsanje*

## Malawi Community Health Supply Chain Midline Evaluation Report

In terms of performance monitoring, FGD participants from the HF level believe cStock enables supervisors to monitor the work of the HSAs and assess the HF performance.

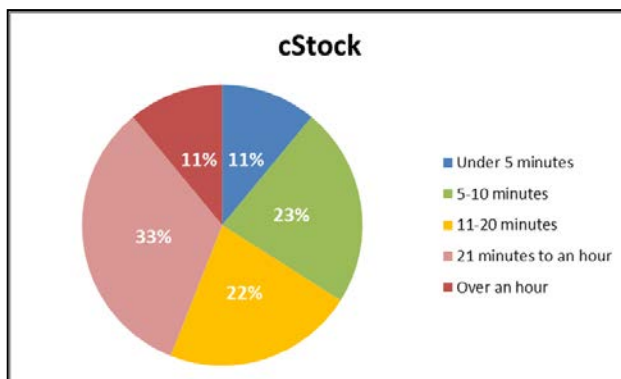
*“We are also able to monitor and evaluate ourselves when we count and record the drugs used per month.” – HF in-charge, Nkhotakota*

On asking District IMCI Coordinators how often they access data on the dashboard, two of three EM District IMCI Coordinators reported accessing the dashboard once or twice a week, while the other reported even more frequent access with three to five times a week. In EPT districts, two of three District IMCI Coordinators reported accessing the dashboard once per month, while the third reported one to two times per week. It should be noted that District IMCI Coordinators in the EM districts received more training in the web-based cStock dashboard than EPT districts, and used cStock more consistently for coordination and planning.

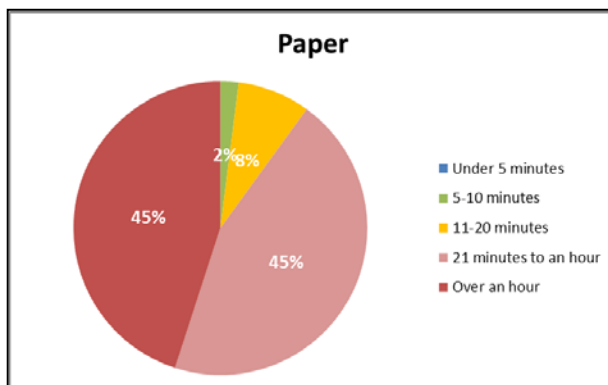
### Efficiency: Time to prepare and submit requests and collect products

The midline evaluation compared the amount of time to prepare a report using cStock with the traditional method of preparing a paper report. 56% of HSAs said that with cStock they took twenty minutes or less to prepare an SMS report, while 92% stated the paper report took more than 20 minutes. Submitting reports is also much faster with cStock than with paper. In addition, 99% of LIAT HSA respondents (n=158) found that cStock saved them time collecting products.

**Figure 4: Time taken to prepare and submit the cStock SOH report**



**Figure 5: Time table to complete the logistics form**



## Malawi Community Health Supply Chain Midline Evaluation Report

Qualitative data supported survey findings in this respect, affirming that cStock saves users time and resources. FGD participants, both HSAs and HF staff, said that cStock is significantly more time- and effort-efficient, particularly in comparison to the paper form, which led them to prefer using cStock. HSAs observed that cStock has resulted in a marked reduction in the significant effort, time and/or money they had previously been spending in collecting products from the health facility. cStock and its components – e.g. sending messages and receiving feedback – were described as a fast system. HF staff specifically noted that the dashboard facilitates sharing of drug consumption data, which saves them time as well.

*“...as for cStock, the report goes the fastest and gets me the supplies I need in time, whilst the paper form can take 3 days, cStock does not.” – HSA, Kasungu*

*“It is within 5 minutes we are done with the report.” – HSA, Nkhotakota*

Prepacking orders not only saves time for the HSA, but also for the Drug Store in Charge, who is usually also the Medical Assistant, allowing them to pack orders when convenient rather than holding up clinical work to pack HSA orders. Over half (57%, n=47) of Drug Stores in Charges reported that they now pack orders before the HSA arrives at the health facility, another 9% said they pack ahead sometimes.

FGD findings were mixed on the subject of pre-packing. HF participants described the ways in which cStock enabled them to prepare products in advance of HSA arrival at the health center, and to avoid being overwhelmed by many HSAs coming to the health center to collect products at once and not being able to serve them. On the other hand, HSAs discussed the experience of receiving a cStock message informing them that their products are ready for pick up, only to find that the products were not in fact packed when they arrived.

*“cStock gives us time to prepare HSAs orders on time. Before we were working under pressure because when the HSA came looking for drugs she/he always found us busy attending to other patients or maybe there was a big queue they were supposed to wait.”*

*“...now with this cStock we find it very easy because we always have time to pack the products.” – HSA supervisor, Nkhatabay*

Feedback from the DVWs revealed that reasons why some did not pre-pack included a lack of space for storing pre-packed orders in HF storeroom, HF staff too busy and/or have other priorities, and both HSA supervisor and Drug Store in Charge not always available (HSA supervisor cannot go into the drug store alone).

### Accuracy and Trust

Measuring accuracy is challenging at HSA level as there are no records, such as bin cards, that show stock on hand (SOH) data to compare with the reported SOH in cStock. At health center level, HSA Supervisors in cStock districts are responsible for maintaining a paper Resupply Worksheet (RSW). On the worksheet, HF staff record the request messages they receive from cStock and how much they actually resupply each HSA against the request. At health center level, the project collected entry data from the RSW to measure accuracy of transcribing data from cStock messages to RSW.

## Malawi Community Health Supply Chain Midline Evaluation Report

Results show an average 93% accuracy across all 5 CCM products comparing amount requested to cStock (SMS order message to HSA supervisor) and quantity documented on RSW (transcribed by HSA supervisor). The survey found an average 72% accuracy comparing quantity of product resupplied, as documented on the RSW (recorded by HSA supervisor), and the amount received according to cStock (SMS receipt message from HSA) for all 5 CCM products.

FGD findings suggested some concerns in how cStock calculates resupply quantities, and the need for more transparency in how these re-supply quantities are determined to enhance HSAs' confidence levels. Some HSAs indicated perceptions that cStock can make errors in its calculations.

*“What happens is when we send SOH, we do not know how the calculations are done and how the health facility prepares our drugs, we receive less drugs” – HSA, Nsanje*

*“In my thinking I thought cStock does not check the population but how the supply of the month went” – HSA, Machinga*

Some HF participants indicated that they do not always trust the information that HSAs report via cStock.

*“It’s possible and can be easily noted that the information from HSA is not true.” – HSA supervisor, Machinga*

However, HF staff described the manner in which products are distributed to HSAs as more transparent under cStock than before, stating that cStock makes the calculations and the calculations are no longer based on the preferences of particular supervisors/in-charges:

*“There is more transparency now as drugs are not given on a friendly basis, when you find products are ready, we count with the specific HSA for accountability, and one does not need the MA [medical assistant] approval to receive products.” – HSA supervisors, Nsanje*

When District IMCI Coordinators were asked to rank their trust in the quality of cStock data on a scale of 1 (low) to 5 (high), the majority (4 of 6) ranked their trust as high with a 4 or 5. Half of the coordinators said they trust the cStock data more than the paper based reports, one of six said they trust it equally and two of the six District IMCI Coordinators do not trust cStock as much as data received on paper based forms.

## Enhanced Management (EM) – District Product Availability Teams

### Intervention Description and Intervention Support

Along with the use of cStock, the other main feature of the EM approach is the formation of District Product Availability Teams (DPAT) that meet regularly to monitor supply chain performance and discuss ideas to improve it. By design the team is comprised of: District IMCI Coordinators, District Pharmacy Technicians, HSA Supervisors, Drug Store in Charges, and

## Malawi Community Health Supply Chain Midline Evaluation Report

HSAs. DPAT members at district level were ideally meant to meet every quarter, while DPAT members at health facility level were encouraged to meet monthly. HSA supervisors were to travel to attend the district level meeting. No per diem was provided by the project for these meetings as this was not considered sustainable in the long term.

During the initial training DPATs were guided in developing a joint supply chain (SC) vision, setting performance targets and indicators, and developing recognition plans. They were also taught to create a management diary using a notebook to track supply issues and actions taken during DPAT meetings, and to use cStock Health Facility (HF) reports to monitor targets. Data from the cStock dashboard was to be used at district level to guide timely problem solving and decision making to address supply chain issues. The cStock HF reports were to be printed and distributed each month to health centers.

The EM approach was rolled out in 2011 with monitoring and intervention support carried out in 2012. Intervention support included a two day meeting at the end of the first quarter in 2012 for District IMCI Coordinators and District Pharmacy Technicians to discuss EM implementation progress. In the second quarter of 2012, health center staff were trained on how to run an effective DPAT meeting as this was observed to be one of the key bottlenecks to effective implementation of the DPAT model at HF level. At this same time, the HF level of the DPAT model was renamed by some as the Health Facility Product Availability Team (HPAT) on account that it is run solely at health facility level. In the third quarter, the resupply worksheet (RSW) was modified in some districts to allow for better supply chain performance monitoring using already existing data at HF level rather than leaving success of DPAT performance improvement meetings to depend on ability of district level to print and distribute performance report from cStock to every health facility in a resource-constrained environment. Joint monitoring and supervision visits by District IMCI Coordinators and SC4CCM of DPAT uptake and sharing of quarterly reports on performance were carried out throughout the year.

### Results

Table 2 shows the sample of district staff in EM districts interviewed during the midline evaluation from which the following results have been derived.

**Table 2: EM sample sizes**

Title	Kasungu	Nkhotakota	Nsanje	Total
District IMCI Coordinators	1	1	1	3
Drug Store in Charge	13	6	6	25
HSA Supervisors at HF	13	6	6	25
HSAs	42	21	18	81

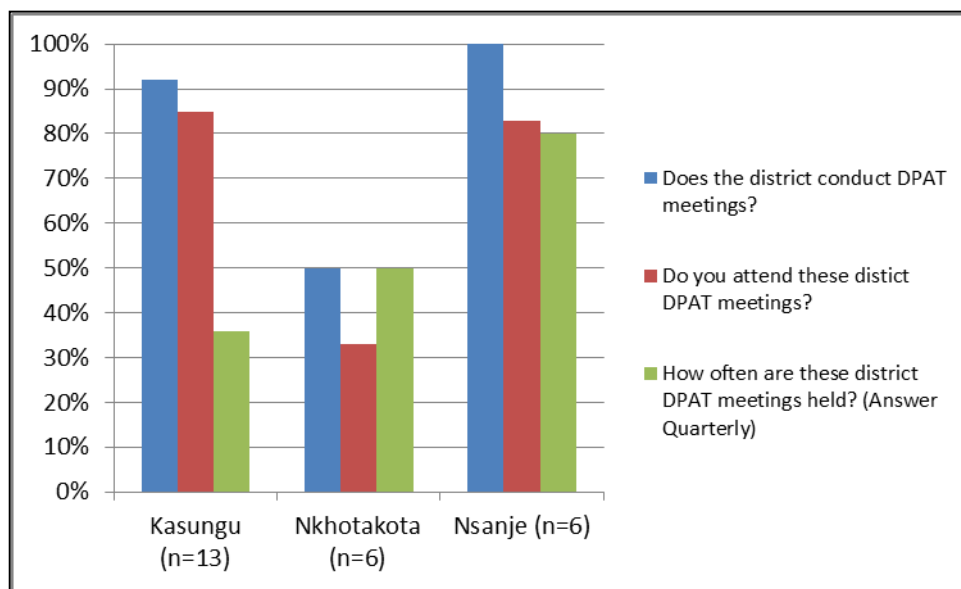
#### **Training coverage**

96% of HSAs surveyed in all three districts were trained; 100% in Nkhotakota, and Nsanje and 93% in Kasungu. 100% of HSA supervisors surveyed were trained in two districts – Nkhotakota, and Nsanje - and 92% in Kasungu. Training coverage among surveyed Drug Store in Charges was less with 83% in Nkhotakota, 33% in Nsanje, and 92% in Kasungu.

**DPAT Meetings**

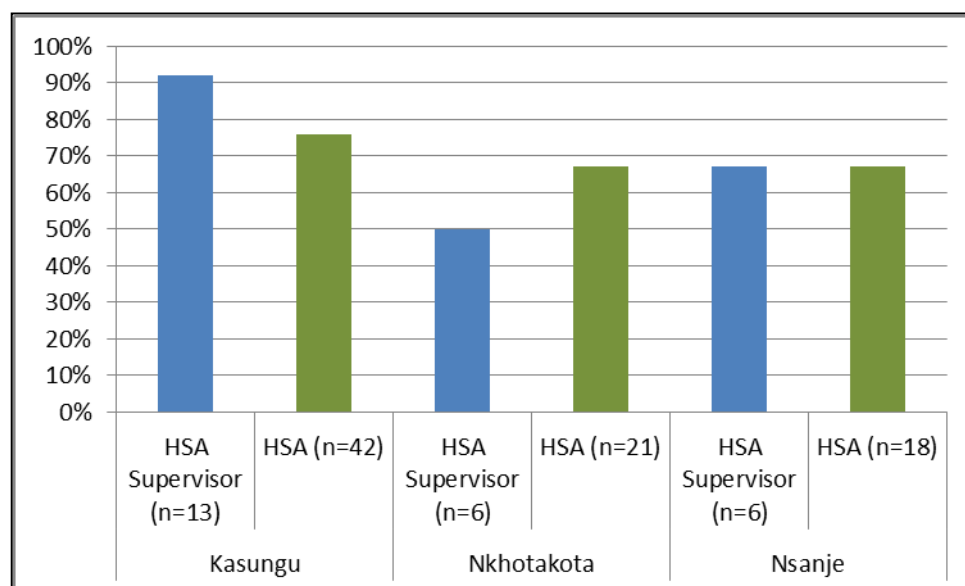
DPAT meetings at the district level were to be held at least quarterly in all three districts. All three District IMCI Coordinators report that DPAT meetings were conducted at district level. However, 100% of HSA Supervisors in Nsanje and 92% in Kasungu reported that their district conducts DPAT meetings, but only 50% reported this in Nkhotakota. 80% of HSA Supervisors in Nsanje reported that the meetings are held quarterly compared to 36% in Kasungu and 50% in Nkhotakota. Feedback from DVWs was that Kasungu and Nsanje district took advantage of Quarterly CCM Review Meetings to hold the DPAT meetings.

**Figure 6: Frequency and attendance at DPAT meetings reported by HSA supervisors**



HF DPAT meetings at health centers were held more frequently than at district level. Across the three districts 72% of HSA supervisors report conducting and 72% of HSAs report attending a HF DPAT meeting in the last three months. These results varied between districts with 82% of HSA Supervisors in Kasungu reporting that they attended a HF DPAT meeting in last three months compared to 60% in Nsanje and 50% in Nkhotakota. Similar results were seen for the responses by HSAs with 76% of HSAs in Kasungu reporting they attended a DPAT meeting in last three months compared to 67% in the other two districts. DVW feedback was that in some districts the HF DPAT meetings were aligned with the timing of HSAs monthly resupply collection so HSAs traveled to the HF for the meeting and picked up supplies at the same time.

Figure 7: Attended a HF DPAT meeting in the last 3 months



Responses during FGDs support the survey results with reported meeting frequency ranging from not having met yet, to meeting quarterly, to meeting monthly with more frequent meetings more often seen at HF level compared to district level.

*“in Liwaladzi we met twice in the past year and we last met in December” – HSA, Nkhotakota*

*“As for us, we meet every Saturday of the second week in our community” – HSA, Nsanje*

*“For us, we have never met, we tried three times and for all those times, we have failed to meet, we can receive messages to go for HPAT, and only to find the in-charge is out of station and he does not communicate that the meeting has been cancelled” – HSA, Kasungu*

*“At district we have not met this year...we met twice last year...I do not know, we were supposed to meet quarterly last year” – HSA supervisor, Nsanje*

*“But at health centre we meet on a monthly basis” – HSA supervisor, Nsanje*

HSA supervisors who attended HF DPAT meetings (n=58) reported on a variety of topics covered, including: 79 who mentioned reporting (including timeliness and completeness), 53% reported discussing stock management (including expiries and product availability), 33% mentioned performance improvement, and 13% discussed performance and recognition plans.

During FGDs HSA supervisors reported that meeting topics varied from HSA performance, reporting rates, supplies to progress towards targets and difficult CCM cases.



## Malawi Community Health Supply Chain Midline Evaluation Report

*“We talk about our reporting rate and how best to improve it, the products.” – HSA, Nsanje*

*“Sometimes it happens that you receive less products when you see more cases, we discuss how best to cater for the cases.” – HSA, Kasungu*

*“For the drugs used, we compare the cases and drug consumption and we are able to report if the work done has achieved completeness.” – HSA, Kasungu*

HSA Supervisors reported similar topics were discussed ranging from HSA performance issues, product supply management and stock outs, reporting rates to recognition and village health committee roles.

*“We also discuss the over-stocking or under-stocking and we discuss how we can share the drugs and these meetings help us to know who has more drugs and we share.” –HSA supervisor, Nsanje*

### **Usefulness of DPAT Meetings**

All 3 of District IMCI Coordinators and 100% of HSA supervisors when asked through the survey reported finding DPATs useful with the main benefit cited as being better product availability. They also responded that solutions were made collectively and team work was strengthened, with improved planning and direct feedback from supervisors and improved performances by HSAs and coordination at all levels.

When HSA Supervisors were asked why the DPATs were useful they responded that DPATS help ensure product availability at the community level, help identify ways of making sure HSAs have products in village clinics, and help identify and improve shortfalls. Other responses included being able to assist each other on practical problems and share ideas and solutions to challenges; they also get updates on performance and performers are congratulated or complimented.

During FGDs HSAs discussed the value of DPAT meetings to enhance team work, improve communication between team members, and improve the relationships between HSAs and the Drug Store In-Charges.

*“For us we share ideas during the meeting...as a single person you cannot build a house...we are motivated.” – HSA, Kasungu*

*“We also discuss and encourage team work among the MA and us to work together, because when we send SOH , we depend on them to respond all the time, and that has enhanced our communication and team work.” – HSA, Nkhotakota*

*“These meetings have enhanced our relationship with the in-charge, initially we could go to the health facility and return to village clinics without drugs and sometimes they would ignore us and continue with their patients, however, now, they acknowledge our presence and refer us to the supervisor to get our products.” – HSA, Kasungu*

## Malawi Community Health Supply Chain Midline Evaluation Report

There was also some frustration from HSAs in some districts with the lack of follow up to issues discussed at meetings:

*“We have discussed most of the things presented here and so far, there is no action that was taken and we are tired as most of our concerns are not addressed.” – HSA, Nsanje*

*“It is good that you have come and have learnt our problems and challenges, but it is also good to see the fruits of our meetings because I sometimes think our discussions are just for the health facility and they do not go far.” – HSA, Kasungu*

### **Performance and Recognition Plans**

All three District IMCI Coordinators said they have a DPAT performance plan with targets, but only two had printed copies available and could name one performance target when asked on day of survey. 68% of HSA supervisors and 76% of Drug Store in Charges reported that they have a DPAT performance plan with targets, but only 65% of those HSA Supervisors (n=17) and 26% of those Drug Store in Charges (n=19) had a printed copy on the day of the survey. 85% of HSAs knew about the performance targets, however this varied significantly by district with 100% of HSAs in Nsanje, 95% in Kasungu and 52% in Nkhotakota responding that they know about their DPAT performance plan targets. During FGDs supervisors confirmed that targets are included in discussion at DPAT meeting.

*“We use the papers where the vision, mission and the targets are recorded and we always refer to the targets when having DPAT meetings.” – HSA supervisor, Nsanje*

In monitoring performance, a majority of HSA supervisors (56%) reported using cStock HF reports, 40% used the resupply worksheet, 36% used other and 4% used nothing (multiple responses were allowed). 24% of HSA supervisors reported they use cStock data to follow up on non-reporting HSAs, 24% followed up on incomplete reports, and 32% followed up with districts on stocked out products.

All three district IMCI coordinators also use management diaries to document problem solving and track actions and decisions. 100% of HSAs supervisors reported documenting actions and decisions, with 84% using the management diary and 16% using another notebook. Note that the management diary was to be created in a notebook, so likely it is the same as a management diary.

As for rewards and recognition, 92% of HSA supervisors reported knowing their recognition plan and 85% of HSAs are aware of rewards. There is greater knowledge of rewards than are actually given. 68% of HSA supervisors report giving rewards and only 15% of HSAs reported receiving rewards. FGDs highlight that where verbal recognition did occur that this resulted in HSAs being motivated to perform better.

*“Sometimes when we are in our meeting the MA compliments one of the HSA and when he does so, we are motivated as well to perform better so that we can be complimented.” – HSA, Nkhotakota*

## Efficient Product Transport (EPT)

### Intervention Description and Intervention Support

The Efficient Product Transport (EPT) intervention addresses transportation and data visibility challenges between resupply points and HSAs, and is aimed at significantly improving product availability at the HSA level with a minimal expenditure of time and effort. The core features besides cStock are a continuous review inventory control system which includes a flexible schedule aligned to HSA routines. This approach changes the product ordering schedule for HSAs to allow them to order every time they go to the HF for other purposes rather than once a month as had been done previously. This enables HSAs to make smaller, more frequent top-up orders and reduces special trips to the HF for product resupply. The final core feature of the EPT intervention is regular bicycle maintenance performed by HSAs, which leads to a reduced number and severity of breakdowns and repairs needed to keep the bicycles functioning so that HSAs can travel to the HF to collect products as needed.

The EPT approach was rolled out in mid-2011 with a training of trainers held in May followed by training workshops in the three districts in June, August, and October. Joint monitoring by District IMCI Coordinators and SC4CCM staff of EPT uptake and sharing of quarterly results on performance was carried out throughout 2012. Some focus group discussions were held in the third quarter of 2012 to understand the low uptake of EPT and in the fourth quarter, based on feedback received, a job aid for preventive bicycle maintenance that included a maintenance checklist was designed in Chichewa and distributed to HSAs in all three districts.

### Results

Table 3 shows the sample of District staff in EPT Districts interviewed during the midline evaluation from which the following results have been derived.

**Table 3: EPT sample sizes**

Title	Machinga	Mulanje	Nkhatabay	Total
District IMCI Coordinators	1	1	1	3
Drug Store In Charge	6	13	5	24
HSA Supervisors at HF	5	13	5	23
HSAs	21	42	15	78

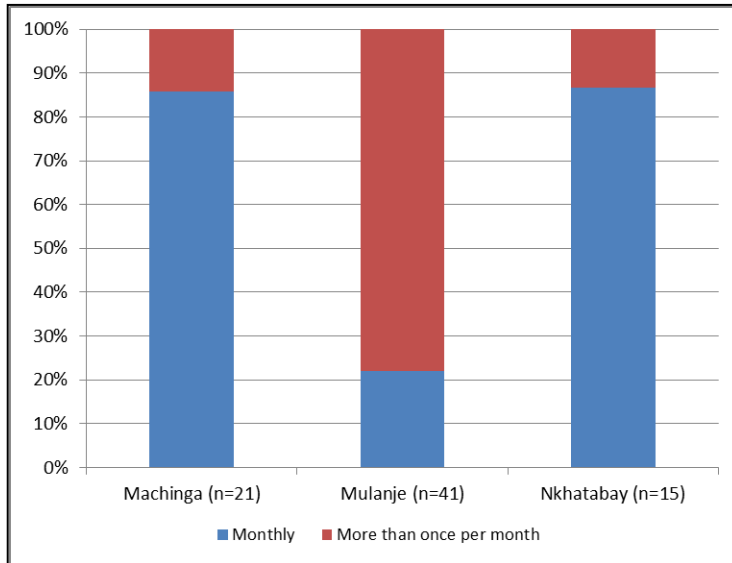
94% of HSAs surveyed in all three districts were trained; 88% in Mulanje, and 100% in Machinga and Nkhatabay. 100% of HSA supervisors surveyed were trained in three districts – Nkhatabay, Mulanje and Machinga, while 92% were trained in Kasungu and 60% in Nkhatabay. Training coverage among surveyed Drug Store in Charges was less with 80% in Nkhatabay, 75% in Mulanje, and 66% in Machinga.

### *Inventory Control System*

The continuous review inventory control system expected that HSAs would order more than once a month. Across the EPT districts, 44% of HSAs reported that they send SOH reports to cStock at the end of the month, 43% said they send them when they needed supplies, 6% said at

the beginning of the month and 4% said other. Disaggregating the data into districts, the results vary significantly with 78% of HSAs in Mulanje requesting more than once a month, compared to 14% in Machinga and 13% in Nkhatabay, where 85% from both districts requested monthly.

**Figure 8: Frequency of SOH reporting by HSAs using cStock**



The number of times HSAs collected products from HCs did not vary much across intervention groups despite the introduction of a different inventory control system in EPT districts. On average, HSAs in EPT districts reported they collected products from HCs 1.05 times in the thirty days before the survey compared to an average of 0.9 times in non-intervention districts and 1.2 times in the EM districts.

Feedback from the DVWs was that the uptake of continuous review inventory control was low because HF staff and HSAs considered the frequency of picking, packing, and stock taking burdensome and that the partner supported parallel supply chains limited ability to resupply HSAs more frequently than monthly as they had fixed resupply schedules.

### ***Bicycle Maintenance***

In assessing if bicycle maintenance training resulted in bicycles being more useable, it is important to consider the context in which the bicycles are used. It should be noted that in general, the EPT districts have more challenging topography (such as mountains) than the EM districts. More HSAs surveyed in the EPT districts had a bicycle (90%) compared to 81% in EM districts and 73% in non-intervention districts. In the EPT districts, 70% of HSAs with bicycles (n=70) received them from a partner organization, while 24% received a bicycle from the MOH and 6% purchased with his/her own money. In EM and non-intervention districts a majority of HSAs with bicycles (55% in EM and 62% in non-intervention) received them from the MOH and 42% in EM and 29% in non-intervention districts received a bicycle from a partner.

There were some differences in how long HSAs had their bicycles depending on the intervention. 79% of HSAs in EPT districts had their bicycle for 3 years or less compared to 77%

## Malawi Community Health Supply Chain Midline Evaluation Report

in EM districts and 58% in non-intervention districts. Within the EPT districts there was also variation, a majority (53%) of HSAs in Machinga had been provided the bicycle more than 3 years ago, whereas in Mulanje and Nkhatabay HSAs on average had the bike for less than 3 years. In Mulanje 88% had the bicycle provided by a partner whereas for the other districts about half of HSAs had the bicycle provided by a partner and the other half by the MOH.

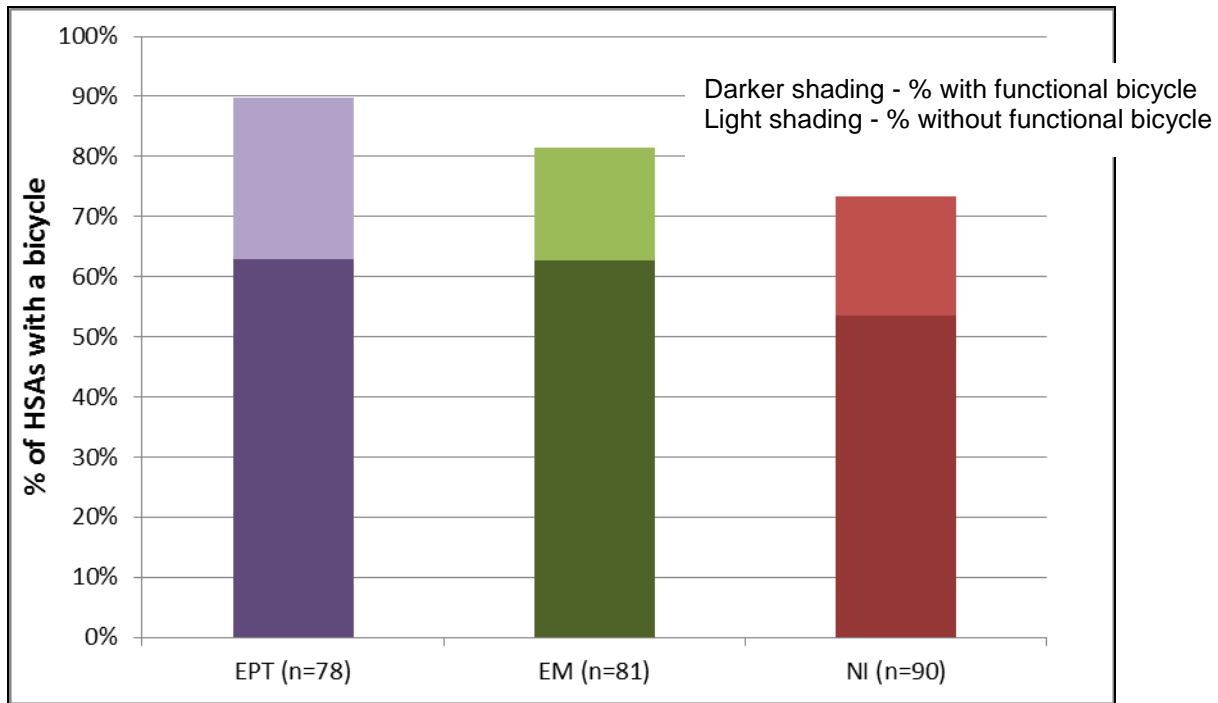
Nearly all HSAs (94%) surveyed in the three EPT districts received training in bicycle maintenance and had tools (90%) to perform maintenance. However, this did not translate into a greater number of HSAs performing regular maintenance when compared to the other intervention groups: 84% of HSAs with bicycles surveyed in EPT districts performed maintenance in the last 30 days compared to 74% in EM districts and 62% in non-intervention districts. It should be noted that very few HSAs in the other districts had received any training or tools for bicycle maintenance. 9% of HSAs in EM had trainings and 29% had received tools while 15% in non-intervention group reported receiving trainings and 26% in non-intervention group had received tools for bicycle maintenance.

**Table 4: Bicycle maintenance**

	<b>EPT</b> (n=78)	<b>EM</b> (n=81)	<b>NI</b> (n=90)
% HSAs with bicycles	90% (n=70)	81% (n=66)	73% (n=66)
% HSAs with maintenance tools	90%	29%	26%
% HSAs trained in bike maintenance	93%	9%	15%
% HSAs performed maintenance in past 30 days	84%	74%	62%

The survey analysis does attempt to measure the quality of the maintenance performed between the groups, and since the EPT districts were trained we would hope that the maintenance performed was higher quality, and ultimately that the bicycles in the EPT districts were more usable. However, on assessing the percentage of bicycles that were functioning on the day of the survey, we see no difference between the districts. Of the HSAs with bicycles 77% of them had a functioning bicycle in EPT districts compared to 70% in the EM districts and 73% in the non-intervention districts.

**Figure 9: % of HSAs with a bicycle and the portion of those whose bicycles were functioning and non-functioning on day of survey**



During some focus group discussions that were conducted during the intervention period (October 2012), HSAs discussed the effectiveness of the training. Some found the training useful while others felt the time for bicycle maintenance training was inadequate, especially for the females who had no previous knowledge on the workings of a bicycle.

*“On my part, I had no knowledge on how to fix the bicycle, but now [after the training] I can fix and work on the free wheel.”*

*“The time for bicycle maintenance was not enough and we were supposed to read their manual...the time was inadequate for all the materials to sink in.”*

*“As for me, I did not have knowledge about a bicycle and I could not ride a bike, however through the training, I am to do both.”*

*“As for me as a lady, that bicycle training, as for me, I feel short-changed. I was unable to grasp all they taught during a day.”*

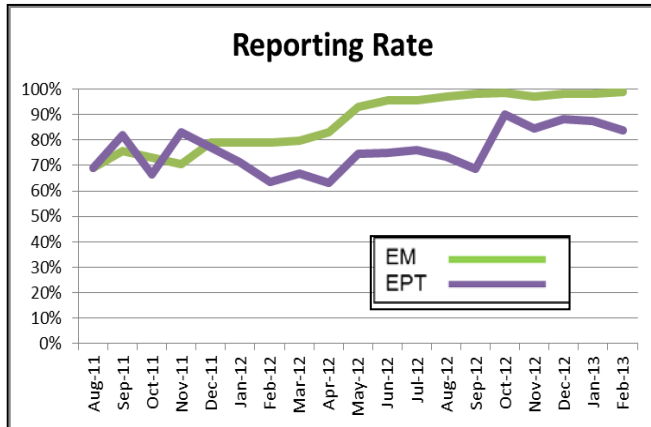
## Comparing Supply Chain Performance in EM and EPT groups

In addition to survey data, cStock data were analyzed to assess trends in supply chain performance over the entire intervention period. cStock is able to provide data on key performance indicators over time rather than just on the day of the survey, which provides a better picture of how well the supply chain is functioning. Since cStock was implemented in both the EM and EPT districts, it was used to compare the two interventions by looking at supply chain performance indicators, such as reporting rates and lead times, over the intervention

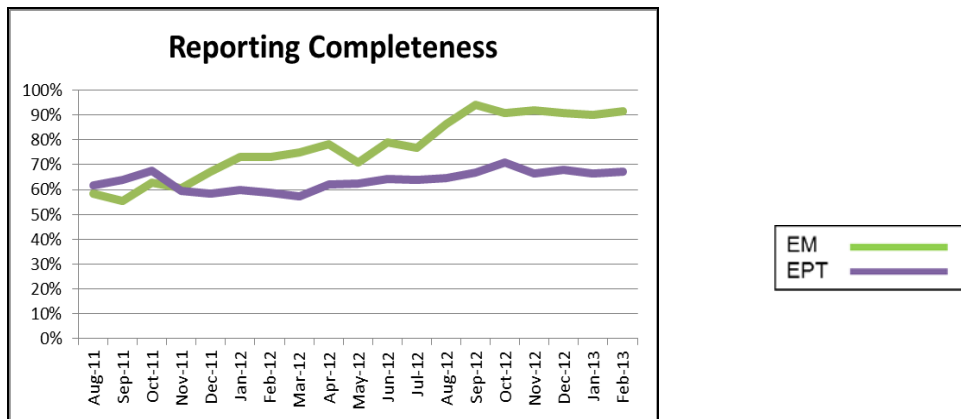
## Malawi Community Health Supply Chain Midline Evaluation Report

period; As the non-intervention districts were not using cStock the comparison does not extend to these districts.

**Figure 10: cStock reporting rates for EM vs. EPT districts, August 2011 to February 2013**



**Figure 11: cStock reporting completeness rates for EM vs. EPT districts, August 2011 to February 2013**



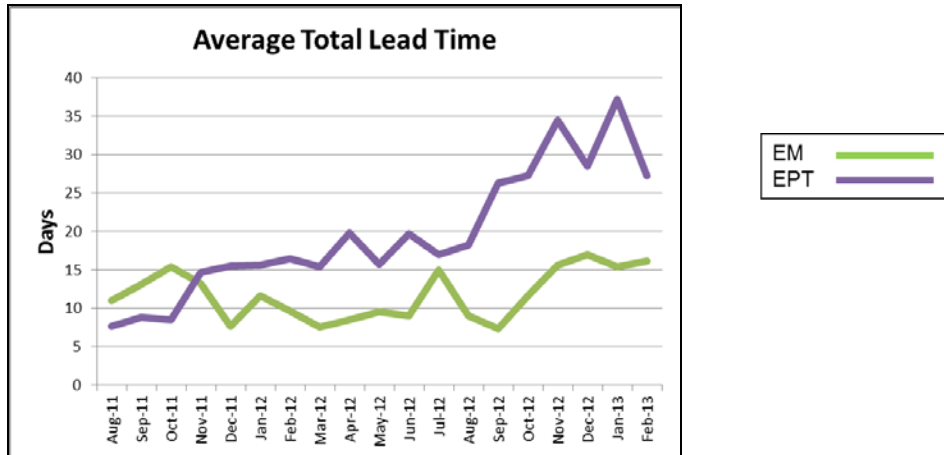
Reporting rates in cStock for both EM and EPT districts (Figure 10) were 69% in August 2011, the first month of implementation, and continued to rise for both intervention groups over the period of the intervention. In EM districts the reporting rate continued to rise steadily to consistently be above 90% over the last 10 months of the intervention period (May 2012 to February 2013). In EPT districts, the rates fluctuated over the 18 month intervention period, however for the last four months were consistently above 80%, but never to the levels seen in EM districts.

Average reporting completeness rates also improved over time in EM districts, but were consistent in EPT districts (Figure 11). The average completeness rates in EM districts in August 2011 were 59% and by February 2013 were above 90%, while in EPT districts completeness rates were 62% in August 2011 and were 68% by February 2013, showing no improvement. In general, the EM districts performed better than EPT districts on all aspects of reporting. On time

## Malawi Community Health Supply Chain Midline Evaluation Report

reporting could not be compared across intervention groups because of the different inventory control systems.

**Figure 12: cStock average total lead times for EM vs. EPT districts, August 2011 to February 2013**

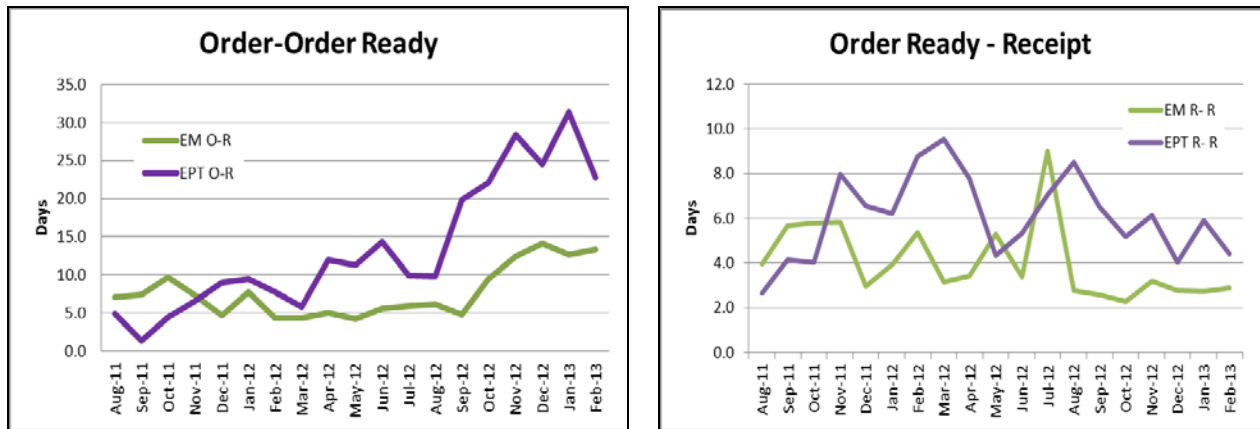


The lead time is the time it takes between the HSA requesting products and then receiving the products: in cStock this is called the total lead time. The average total lead time increased considerably during the eighteen months of the intervention in the EPT group compared to the EM group. By the end of the intervention period the time between request and receipt could be as high as 35 days, whereas for the EM group the total lead time remained between 5 and 15 days.

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 health center 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 HAS, or the result of both parties’ actions. On average HF’s in the EM group took 7.7 days to respond after receiving a request SMS, while the HCs in the EPT group took 13.5 days. HCs in EPT districts in recent months have taken up to thirty days to respond to product order request messages.



Figure 13: cStock average lead time components for EM vs. EPT districts, August 2011 to February 2013

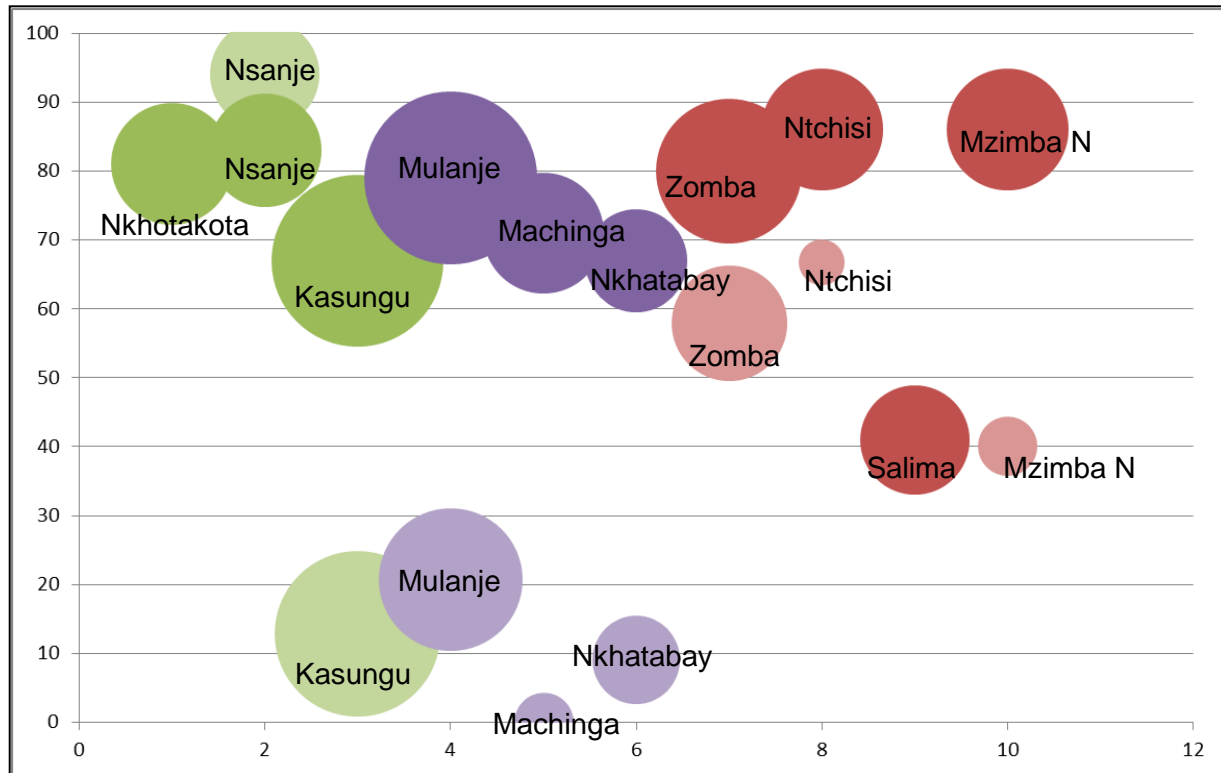


In reviewing order fill rates and stock outs in cStock over the intervention period there was no significant difference between the intervention groups and therefore this data has not been presented. Product availability will be discussed in the next section.

### Product Availability

At midline all 249 HSAs sampled were managing CCM products for diarrhea, malaria, and pneumonia compared to baseline where only 139 of 249 sampled HSAs were managing health products. Product availability had significantly improved since the baseline when only 27% of HSAs who managed health products had the four tracer drugs (cotrimoxazole, LA 1x6, LA 2x6, and ORS) in stock on day of the survey. At midline, 62% of HSAs had the four tracer drugs. Similarly 75% of HSAs at midline had all 3 tracer drugs (cotrimoxazole, LA 1x6 and/or LA 2x6, and ORS) in stock on day of survey compared to 35% at baseline. When looking at the results across districts and intervention group as shown in figure 13 there was an overall increase in % of HSAs who had all three CCM drugs in stock on day of survey from baseline to midline, except Nsanje and Salima.

**Figure 14: % HSAs with all 3 key CCM drugs in stock on day of survey by district, BL vs. ML**

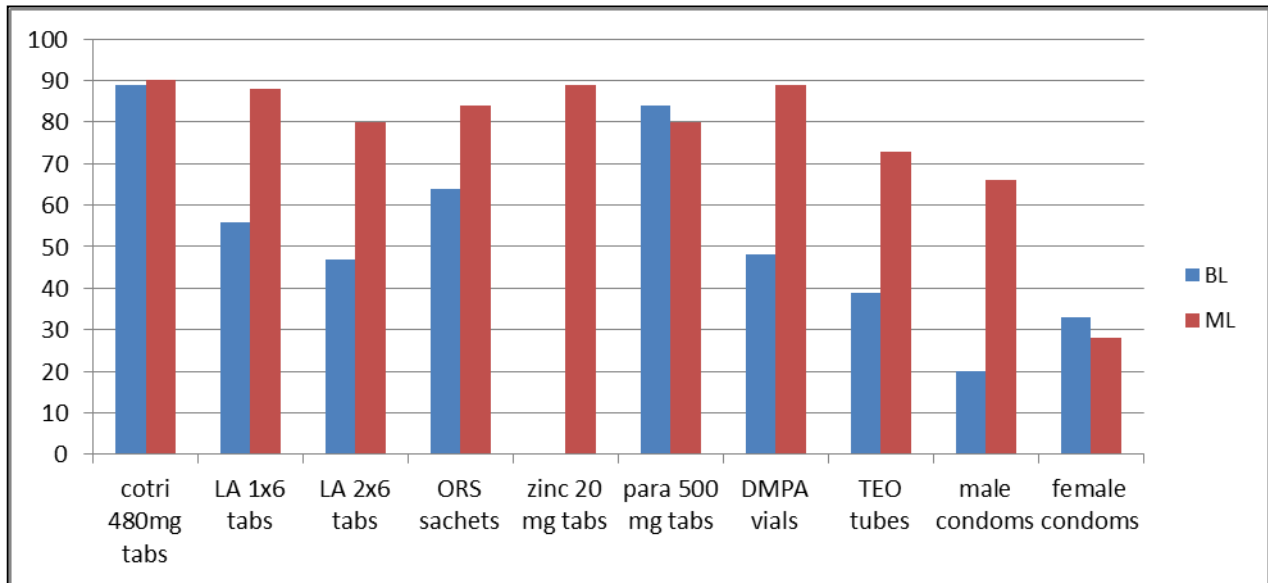


*Notes on graph*

- 3 key CCM drugs include cotrimoxazole, LA 1x6 and/or LA 2x6, ORS
- Light shading represents baseline, dark shading represents midline
- Circle size represents sample size for district
- Green bubbles represent EM districts, purple bubbles EPT districts and red bubbles non-intervention districts
- The baseline bubble for Salima is hidden by the midline dot as there was no change in product availability between midline and baseline

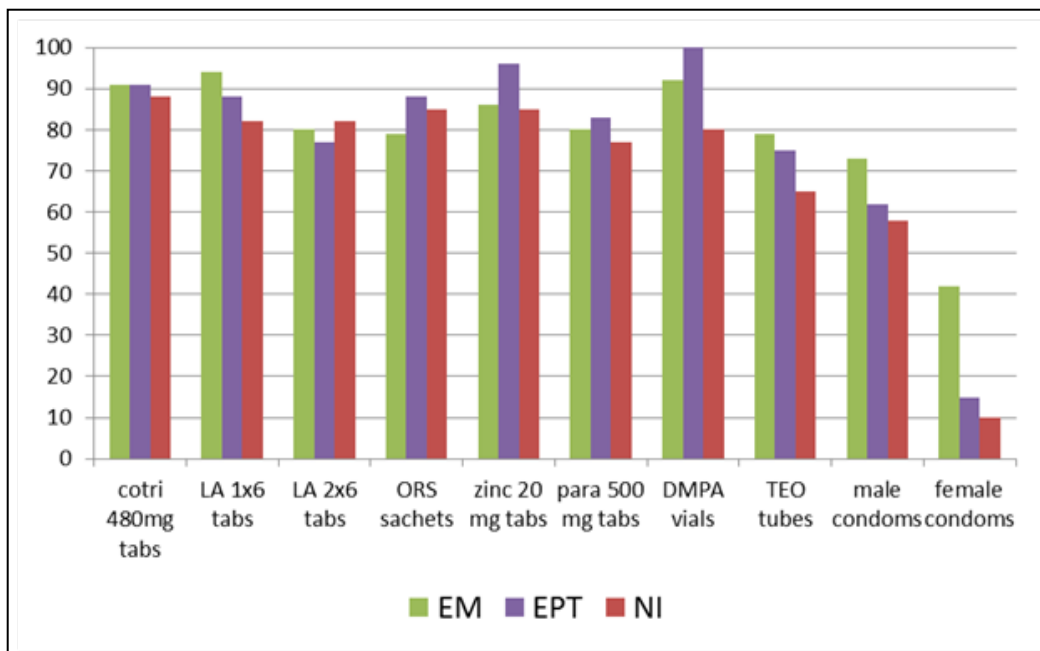
When looking at product availability by individual product there was an increase in availability for all products except paracetamol, cotrimoxazole and female condoms as seen in figure 14. It should be noted that product availability for paracetamol and cotrimoxazole was relatively high at baseline and so there was less room for improvement between baseline and midline.

Figure 15: % HSAs in stock day of survey by product, BL vs. ML



On comparing availability of individual products between intervention groups there was no real difference or pattern in availability observed between any of the intervention groups. Figure 15 below shows high availability across all groups for the majority of products.

Figure 16: % of HSAs in stock by product and intervention group



A differences in differences (DiD) analysis was conducted across the intervention groups to detect intervention impact on the project’s key indicator, CCM product availability. Results showed no difference over time across the groups for the key indicator of all 3 or all 4 CCM products in stock on day of visit. The DID detected significant improvements in product

## Malawi Community Health Supply Chain Midline Evaluation Report

availability for LA 1x6 in the EM group, and for LA 2x6 in the EPT group, compared to the non-intervention group. These improvements are a good result, but cannot be generalized as an overall positive effect of the interventions themselves, as each intervention group only affected one product.

**Table 5: Difference-in-differences (DiD) regional results: EM and EPT groups**

Region	EM <sup>++</sup>						EPT <sup>+++</sup>					
Group	EM		Non-intervention		DiD <sup>+</sup>	N	EPT		Non-intervention		DiD <sup>+</sup>	N
Time	Base-line	Mid-line	Base-line	Mid-line			Base-line	Mid-line	Base-line	Mid-line		
Percent of HSAs who manage Cotrimoxazole 480mg tablets, in stock on DOV	78	91	91	86	18	242	84	93	91	90	10	163
Percent of HSAs who manage ORS sachets, in stock on DOV	58	78	79	85	14	242	40	90	79	88	41	163
Percent of HSAs who manage LA 1x6 tablets, in stock on DOV	40	94	59	81	<b>32*</b>	242	42	87	59	85	19	163
Percent of HSAs who manage LA 2x6 tablets, in stock on DOV	32	79	62	80	29	242	21	78	62	80	<b>39*</b>	163
Percent of HSAs who manage all 3 products, in stock on DOV	36	73	53	74	16	242	17	76	53	80	32	163
Percent of HSAs who manage all 4 products, in stock on DOV	28	63	32	61	6	242	9	61	32	63	21	163

\*\*\*p<.001    \*\*p<.01    \*p<.05

+ DiD is calculated as (Intervention Midline% – Intervention Baseline%) – (Comparison Midline% – Comparison Baseline%). See Figures 3.a-d for a visual representation of this calculation. Results displayed represent two steps in the analysis of the data: the significance, denoted by the stars, represents the results from the multivariate logistic regression on the time-group interaction variable, which is the key independent variable of a DiD regression. Since the interaction coefficient is non-intuitive, we have instead depicted the difference over time between the intervention and non-intervention groups using the predicted probabilities resulting from the regression. Essentially, this is the net percentage point change in the ESHE region once the comparison group change is subtracted.

++ Controls: *Uses bike as primary transport, number of years worked as a HSA, has network coverage, and storage area locked.*

+++ Controls: *Receives feedback from supervisor, number of years worked as a HSA, has network coverage, and storage area locked.*

## Discussion

The midline evaluation of SC4CCM in Malawi found a significant improvement in product availability at community level, which more than doubled from baseline to midline. Given the introduction of parallel supply chains and PHC kits, however, the increase was likely driven at least partially by more products in the system, and not entirely by improvements in the supply chain. Results from the project's TOC demonstrated that improvements in the supply chain were achieved through the interventions, and therefore could also be partially responsible for improvements in product availability; however, it is difficult to attribute all gains to SC4CCM's interventions specifically. A parallel supply chain in this context refers to a system established by a partner that bypasses the MOH supply chain system and either supplies HSAs directly or pre-packs for HSAs and leaves the package at the facility for collection by the HSA. During the intervention period, the project successfully partnered to pilot test moving away from the parallel supply chain in one EM district to see if it was achievable without compromising on product availability for HSAs. The model that was piloted was for the partner to deliver HSA product requirements in total to the health center and have the health centers distribute to HSAs using the cStock reporting and resupply mechanism. The pilot partnership demonstrated that there were significant cost savings associated with using the MOH system without any negative effect on product availability.

In considering the SC4CCM interventions, cStock achieved its objective by improving visibility of community logistics data in both intervention groups. In the six intervention districts, cStock is now the primary means for HSAs to request product resupply and has saved them time in submitting data and collecting products. Midline results show that users find the system easy to use and understand, and reporting rates were consistently above 80% over the 5 months leading up to the survey in both groups. It has been proven that cStock addresses the changing needs of the community health program, contributing to better availability of data for more timely decision making and improvements in efficiency in the system. Results of this evaluation show some minor data quality issues exist, but not at a scale that appears to compromise system credibility. Conducting further research to validate data inputs and/or system issues is needed to enable them to be addressed. Non-intervention districts still rely on a non-standardized paper system for requesting products; evidence from the midline survey suggests that this manual system works much as it did at baseline, with little standard HSA data visible to higher levels or used for resupply or management decisions at higher levels.

The Enhanced Management (EM) intervention – which combines cStock and DPATs -- showed the most promising improvements in supply chain practices and processes, such as reporting rates and lead times. Since cStock was used by both intervention approaches, gains made by the EM group can be directly attributed to the DPAT component as the driver of higher level of performance in that group. The EM intervention had good uptake; DPAT meetings were held fairly regularly and facilitated better teamwork and led to performance monitoring, problem solving, action-planning, and decision-making that in turn improved performance results for key supply chain indicators.

The EM intervention is undermined slightly by the high turnover of HF staff in some districts and the need to train these staff in cStock and DPAT to ensure that the intervention continues to be implemented and effective. For example, in Nkhotakota only 60% of HSA Supervisors

## Malawi Community Health Supply Chain Midline Evaluation Report

reported being trained in the EM intervention, perhaps contributing to the lower number of HF DPAT meetings in this district. Other areas of weakness include the challenge of transporting all HSA supervisors to the district for District level DPAT meetings.

The midline results determined that the Efficient Product Transport (EPT) intervention was not as effective as EM, and findings showed the intervention did not take off as expected. The continuous review inventory control mechanism was not implemented by HSAs as this was perceived as burdensome for both HC staff and HSAs. Furthermore, bicycle maintenance training did not achieve the intended impact. While results show that HSAs in EPT districts were more likely to have maintenance tools and were trained in bicycle maintenance, they were not any more likely to maintain their bicycles or have better functioning bicycles with fewer breakdowns.

### Theory of Change

At the time of this midline evaluation, the project found it essential to revisit the Malawi-specific TOC framework that served as the foundation for building the tested hypotheses. The TOC laid out causal pathways made up of building blocks, or preconditions, leading up to five key preconditions, hypothesized as precursors to the overall objective of improved HSA product availability (see appendix A for the Malawi specific TOC). Preconditions related to cStock were successfully put in place and the causal pathway leading to key precondition 2 was validated: *HSAs or persons responsible for resupply know how, where, what and how much of each product to requisition or resupply and act as needed.*

The DPAT component of the EM intervention primarily addressed precondition 5: *HSAs are motivated to perform their roles in the CCM product supply chain.* While motivation is challenging to evaluate robustly in a multi-dimensional evaluation, the fact that reporting rates and lead times were better in the EM districts than EPT districts suggests that staff in these districts were more motivated to perform their supply chain roles. In addition to precondition 5, the EM intervention also had the potential to influence preconditions 1, 2, 3 and 4: product availability at higher levels, staff capacity, storage and transportation. The DPATs offer an opportunity to address multiple supply chain issues at all levels, however these are likely to be addressed after issues around resupply and reporting have been solved. So while the changes were not significant for these preconditions, there may be opportunities in the future to address these preconditions through the DPAT mechanism.

The causal pathway for the EPT intervention focused heavily on precondition 4, or improving transportation of goods from HC to HSA levels: *Goods are transported between resupply points and HSAs.* The intervention hypothesized that a flexible inventory control system and routine maintenance would result in improved transportation, but because HSAs did not find the inventory control system convenient or efficient, and routine maintenance was difficult to do, neither of these elements were well implemented. In the end, the causal pathway embodied by the EPT intervention could not be validated and further exploration on the best way to address transportation challenges in Malawi is required.

While the project's hypothesis that innovative interventions could significantly improve product availability compared to non-intervention districts was not achieved, the midline evaluation did highlight promising practices for the community supply chain in Malawi and provided evidence on which interventions add sufficient value to be scaled up. These promising practices are

## Malawi Community Health Supply Chain Midline Evaluation Report

improved supply chain processes which logisticians widely recognize as a good foundation on which to build a robust well-functioning supply chain. As partners move away from parallel supply chains, strengthening and scaling up these improved supply chain practices will be essential to ensuring product availability gains can be maintained or improved.





## Recommendations

After reviewing the findings from the midline evaluation, participants at the National Data Validation Workshop recommended the scale-up of the EM package, with a few modifications based on lessons learned over the intervention period and feedback from district staff. The National Data Validation Workshop's proposal for scale up of the EM package, including cStock as an integral element of the package, was based on the difference in supply chain performance levels between EM and EPT groups.

The EM intervention includes both cStock and the formation of district teams around product availability and supply chain performance. While cStock quickly proved to be an effective intervention, it is the combination of DPAT and cStock, the full EM package, which proved to result in better supply chain performance. cStock improved data visibility at all levels, communication between levels and efficiency of the resupply system. The DPATs provide staff with the skills and forum to use that data to monitor performance, problem solve, make good decisions and develop action plans.

Overall the recommendation is that District level DPATs meet quarterly and that HF DPAT meetings (named HPATs by users) are conducted monthly. One modification in the DPAT structure, recommended through the DVWs, is to involve Cluster Supervisors. Cluster Supervisors will replace the HSA Supervisors at the district level DPAT meetings and also attend monthly HF DPAT meetings to ensure a link between the two levels. This was seen as a strategy to reduce the costs associated with the district level DPAT meetings, and also a way to involve Cluster Supervisors who play an important role in supporting HSAs and community based health programs.

The curriculum will also be expanded to include techniques on running effective DPAT meetings and how to use the resupply worksheet in the absence of printed cStock HF reports, both of which were lessons derived during the intervention period. Trainings on both of these areas were added through the course of the intervention period as project monitoring data highlighted these two areas as impeding the success of DPAT implementation.

Other recommendations from the DVWs which were not previously included in the interventions were:

- Conducting an EM orientation to the District Health Management Teams (DHMT) so that they can support DPATs in achieving their goals, and in using cStock in district level planning to promote better availability of community health products;
- Establishing a National Product Availability Team to complement the DPATs and address larger issues of product availability beyond the control of the district; and
- Institutionalizing on-the-job training for all new staff to the district on the use of cStock and in their role within DPAT.

Participants at the National Data Validation Workshop recommended discontinuing the flexible inventory control system and the bicycle maintenance training due to a lack of evidence that these interventions impacted the performance of the supply chain. If bicycle maintenance was to be attempted again in the future the lessons learned from this experience are that the training

## Malawi Community Health Supply Chain Midline Evaluation Report

must be for longer than one day with a focus on hands on practice for HSAs' own bicycles. It was also felt that HSAs should be provided with simple but good quality tool kits to conduct preventive maintenance and simple repairs and clear job aids that include a maintenance schedule in the local language.

## Conclusion

Improving visibility of logistics data from the community level, and the quality and types of decisions HC, district and central managers are able to make because of this data, is essential to strengthening the supply chain, and laying the foundation for improving the overall availability of essential health products at the community level. Evidence from the midline assessment and data validation workshops shows that creating customer oriented teams with a mission to improve product availability and empowered with timely, accurate data for enhanced decision making is feasible and affordable and leads to improved supply chain performance. There is broad consensus that scaling up the EM approach to the whole country is essential for strengthening the community health supply chain and product availability of essential medicines and should be considered a priority in efforts to achieve MGD4 goals and Malawi's specific plans to improve child health outcomes nationally.



# Appendix A

## Description of SC4CCM Theory of Change Model

The SC4CCM Theory of Change model provides the framework for the project evaluation, identification of solutions and innovations, monitoring of change and demonstration of success. The interventions and solutions proposed by SC4CCM to strengthen supply chains for community case management are based in the analysis of the relative strength of these system performance elements or causal pathways (color coding) and their preconditions (boxes).

The TOC model diagrams the pathway of change to the intermediate and ultimate goals, or long term outcomes, of the SC4CCM project (represented in the light blue boxes at the top of the diagram). Described below are the key components that make up the pathway of change.

### Key components

**Preconditions** - The preconditions are the building blocks that the project believes necessary to achieving the long term outcomes. The preconditions are represented in the boxes below the two goals and are color coded to represent how each precondition fits into one of three hypothesized causal pathways. The size or position of the precondition box does not indicate the importance or significance of that precondition, each precondition is considered necessary for change to occur.

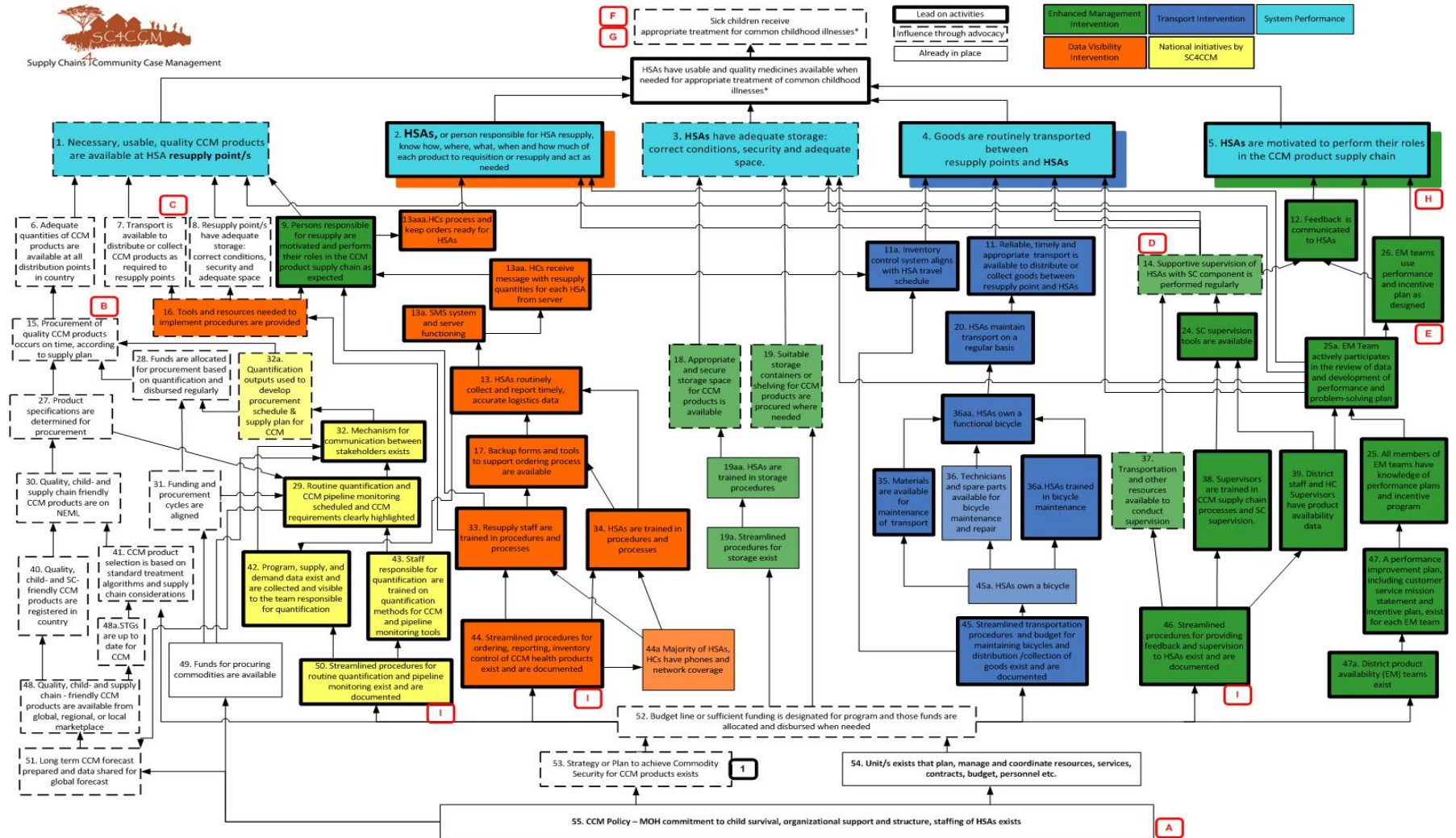
**Arrows** - The arrows indicate the sequence that preconditions should be addressed, with a belief that one precondition cannot be fully accomplished until the preconditions before are achieved. This sequence creates the pathway of change.

**Interventions** - Interventions are central to the theory of change as they describe the types of activities required to bring about each precondition on the pathway to change. Country specific interventions have been identified according to weak or missing preconditions found in the baseline evaluation. Rather than adding more detail to the diagram, these are described in detail in the implementation plan.

**Indicators** - Each precondition is a preliminary outcome with indicators (numbers within each precondition box) that measure the success of interventions adopted to achieve the preconditions.

**Assumptions** - Assumptions, represented by letters, are the necessary factors for change that are outside the project control. These assumptions demonstrate the limitations to what the project can expect to change alone and emphasize the need for collaboration with governments and partners.

Theory of Change Diagram



## Appendix B: Core Indicators

### **Main SC4CCM Objective: (Ensure that) CHWs have usable and quality medicines available when needed for appropriate treatment of common childhood illnesses**

- % of CHWs with key CCM products in stock on day of visit, by product
- % of CHWs with key CCM products adequately stocked on day of visit, by product (based on stock on hand and number of issues made)
- % of CHWs with any stockout of key CCM products in past 1 month (30 days), by product
- Mean duration of stockouts of key CCM products in past 1 month (30 days), by product
- Quantity of lost/damaged/expired key CCM products at CHW level on day of visit, by product

### **Pre-condition 1: Necessary, usable, quality CCM products are available at CHW resupply points**

- % of resupply points with key CCM products in stock on day of visit, by product
- % of resupply points with key CCM products adequately stocked on day of visit, by product (based on stock on hand and number of issues made)
- Mean number of stockouts in key CCM products at resupply points in past 6 months, by product
- Mean duration of stockouts in key CCM products at resupply points in past 6 months, by product
- Quantity of lost/damaged/expired products at re-supply level, by product

### **Precondition 2: CHWs, or person responsible for CCM resupply, know how, where, what, when, and how much of each product to resupply**

- % of CHWs/other re-supply persons trained in ordering system and processes
- % of CHWs/other re-supply persons with accurate knowledge, based on compliance with documented procedures, of:
  - the reporting processes
  - the ordering processes
  - the distribution or collection processes

### **Precondition 3: Goods are routinely transported between resupply points and CHWs**

- % of HSAs using each type of transportation (foot, bike, truck)

### **Precondition 4: CHWs have adequate storage: correct conditions, security and adequate space**

- % of CHWs that have:
  - Adequate storage conditions and security, according to guidelines
  - Adequate space

## Malawi Community Health Supply Chain Midline Evaluation Report

- Mean number of storage conditions met at CHW level

### **Precondition 5: CHWs are motivated to perform their roles in the CCM product supply chain**

- % CHWs who receive supervisory visits
- % of CHWs who receive feedback (written or verbal)



## Appendix C: Data Validation Workshop Participants

Enhanced Management Data Validation Workshop Participant List			
No	Name of Participant	Place of Work	Title
1	Mc Cornell Makala	Lodwa H/c-KU	S.M.A
2	Asautsaine Khomani	Ndamera H/c-NE	H.S.A
3	Clement Jambo	Mkhota-Ku	S.H.S.A
4	Obedi Simbi	Tsamdoka-Nsanje	H.S.A
5	Blamu Makawi	Kalembe-NE	S.H.S.A
6	Moses Zawola	Nkk D.H.O	Pharm Tech
7	Kondwani Kautsa	KU-D.H.O	Pharm Tech
8	Clifford Dedza	MOH-IMCI	Lo
9	Ricky Banda	Mtunthama-KU	S.H.S.A
10	Victor Scott	Ngala-NKK	S.H.S.A
11	Edgar Pezengu	Santhe-Ku	MA
12	Laston Kamwana	NE-D.H.O	E.H.O
13	Donex Mwale	Nkk D.H.O	IMCI Coord
14	Romas Banda	Save	SCM
15	Ernest Kaludzu	MOH-IMCI	M&E
16	Boniface Chimphanga	JSI/SC4CCM	Lo
17	Samuel Chirwa	Unicef	PHC Manager
18	Asante Mphikamezo	Ngala-NKK	S.M.A
19	Idi Ndauma	NE-D.H.O	Pharm Assistant
20	Phillip Chimsanjo	Msenjere-NKK	S.H.S.A
21	Thomas Nampuntha	Msenjere-NKK	S.M.A
22	Anthony Ngomwa	Mbenje -NE	H.S.A
23	Hazel Bilisimu	Trinity-NE	S.H.S.A
24	Juel Makondi	Trinity-NE	CO
25	Joster Banda	Kasungu D.H.O	IMCI Coord
26	John Jandalala	Chamwabvi-KU	H.S.A
27	Esme Ndau	Ofesi-KU	H.S.A
28	Martha Kamphande	NE-D.H.O	S.M.A
29	Mc Collins Phiri	Nkk D.H.O	H.S.A
30	Kondwani Mkandawire	Nkk D.H.O	H.S.A
31	Precious Chilima	Nkk D.H.O	H.S.A
32	Rose Chibwe	Mkhota-Ku	H.S.A

## Malawi Community Health Supply Chain Midline Evaluation Report

<b>Efficient Product Transport Data Validation Workshop Participant List</b>			
<b>No</b>	<b>Name of Participant</b>	<b>Place of Work</b>	<b>Title</b>
1	Kondwani Chikakula	Namandanje-MHG	MA
2	Zuze Steven	Chikweo-MHG	S.H.S.A
3	Fashion Mollen	Namandanje-MHG	S.H.S.A
4	Harold Mwangi	Namandanje-MHG	H.S.A
5	Esther Chidothi	Namandanje-MHG	S.H.S.A
6	Clifford Dedza	MOH-IMCI	LO
7	Mwayi Kamwendo	Mzenga-NB	H.S.A
8	Leo Kaunga	Chikwina-NB	H.S.A
9	Kondwani Shaba	NB D.H.O	Pharm Tech
10	Harrison Sikulamwa	NB D.H.O	Coordinator
11	Aleck Asimah	MHG D.H.O	Coordinator
12	Willard Ruben	Ntaja-MHG	S.M.A
13	Geoffrey Sambani	Mpala-MJ	H.S.A
14	Ramsey Gunde	Mpala-MJ	S.M.A
15	Neffily Matupa	MJ D.H.O	Coordinator
16	Bertha Mponda	Kambenje-MJ	H.S.A
17	Kelita Mwangalika	Kambenje-MJ	S.M.A
18	Felix Kasupa	Thuchila-MJ	S.E.H.SA
19	George Mongolo	Lujeri-MJ	S.E.H.SA
20	Thoma Dinala	MHG D.H.O	H.S.A
21	Auflex Thom	MJ D.H.O	H.S.A
22	Lington Mhango	Bula-NB	MA
23	Roy Makaika	MJ D.H.O	Pharm Tech
24	Bahati Mtambo	MHG D.H.O	Pharm Tech
25	Newtons Kamanga	Bula-NB	S.H.S.A
26	Steve Phiri	Kambuni-NB	H.S.A
27	Andrew Phiri	NB D.H.O	H.S.A
28	Manaseh Banda	NB D.H.O	H.S.A
29	Elasto Chanza	Zomba	Mnager
30	Evelyn Zimba	SSDI-Service	NCH STA

## Malawi Community Health Supply Chain Midline Evaluation Report

### National Data Validation and Sustainability Workshop Participant List

No	Name of Participant	Place of Work	Title
1	Joster Banda	KU D.H.O	IMCI Coord.
2	Dr Medson Semba	ZA D.H.O	D.H.O
3	Dr C. Chimphambano	MJ D.H.O	D.H.O
4	Donex Mwale	NKK D.H.O	IMCI Coord.
5	Evelyn Zimba	SSDI-S	STA-NBCH
6	Dr Thoko Kalua	NB D.H.O	D.H.O
7	Aleck Asimah	MHG D.H.O	IMCI Coord.
8	Gabriel Chipeta	NB D.H.O	IMCI Coord.
9	Neffily Matupa	MJ D.H.O	IMCI Coord.
10	Themba Phiri	MAC	CO-PI
11	Clifford Dedza	MOH-IMCI	LO
12	Phidelis Suwedi	D-Tree	Field Coord.
13	Hopson Ntentaonga	NE D.H.O	IMCI Coord.
14	Dr Y. Mastala	NE D.H.O	DMO
15	Dr W Chisenga	NKK D.H.O	D.H.O
16	Dr C. Mtambo	MZ(N)	DMO
17	Dr Charles Mtibo	MHG D.H.O	DMO
18	Dr D. Kambalame	NS D.H.O	DMO
19	Austine Omiunu	HTSS	SCMEA
20	Dorica Chirwa	HTSS	LO
21	Relia Nkhata	HTSS	MIS Officer
22	John Munthali	SSDI-S	STA-Malaria
23	Dan Wendo	SSDI-S	COP
24	John Sande	MOH-NMCP	H-NMCP
25	Charles Chimenya	CMST	Pharmacist Supply Chain Advisor
26	Ugbede Abu	USAID	Supply Chain Advisor
27	Jessie Mbamba	Salima	DMO
28	Kabango Malewezi	SSDI-S	DB Specialist
29	Dr Kamoto	HTSS	Director
30	Albert Khuwi	HTSS	D Director
31	H. Nsona	IMCI	Prog. Manager



## References

Khoja, S., Durrani, H., Scott, R. E., Sajwani, A., & Piryani, U. 2013. *Conceptual Framework for Development of Comprehensive e-Health Evaluation Tool*. Nairobi, Kenya.: Telemedicine and e-Health, 19(1), 48-53.

USAID | DELIVER PROJECT, Task Order 1. 2009. *Logistics System Assessment Tool (LSAT)*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.

USAID | DELIVER PROJECT, Task Order 1. 2008. *Logistics Indicators Assessment Tool (LIAT)*. Arlington, Va.: USAID | DELIVER PROJECT, Task Order 1.



GOVERNMENT OF MALAWI

MALARIA  
ALERT  
CENTRE 



JSI Research & Training Institute, Inc.  
1616 Fort Myer Drive, 11th Floor  
Arlington, VA 22209 USA  
Phone: 703-528-7474  
Fax: 703-528-7480  
Internet: [www.jsi.com](http://www.jsi.com)

