Malawi

Supply Chains for Community Case Management

cStock RDQA Results Summary

December 2013

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SC4CCM

Supply Chains 4 Community Case Management

Malawi

Supply Chains for Community Case Management

cStock RDQA Results Summary

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.

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Abstract
In December 2013, the Ministry of Health (MOH), with technical assistance from the SC4CCM Project, conducted an assessment of the quality of data submitted on cStock as well as paper Logistics Management Information Systems submitted by HSAs. This report, presented to the MOH, includes the findings of the assessment, as well as the short- and long-term recommendations to improve the accuracy of reported logistics information by Health Surveillance Assistants in Malawi.

Cover photo: Health worker looking at the cStock dashboard Malawi 2013.

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

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Acronyms

CCM	Community Case Management
CHW	community health worker
CO	Co-trimoxizole 480 mg
EM	Enhanced Management
HSA	health surveillance assistant
HC	health center
HMIS	Health Management Information System
IMCI	Integrated Management of Childhood Illnesses
LA	Artemether Lumefantrine 1X6 blisters
LB	Artemether Lumefantrine 2X6 blisters
M&E	monitoring and evaluation
MOH	Ministry of Health
ND	No data
OR/ORS	Oral Rehydration Salt
PA	Paracetamol 500 mg
PPS	probability proportion to size
RDQA	Rapid Data Quality Assurance
RSW	resupply worksheet
SC4CCM	Supply Chains for Community Case Management
SOH	stock on hand
TE	Tetracycline eye ointment
VF	Verification Factor
VCR	village clinic register
ZI	Zinc 20 mg

Executive Summary

SC4CCM is a learning project focused on finding affordable, simple, and sustainable supply chain solutions that address the unique challenges of community health workers (CHW). In Malawi, baseline assessment results in 2010 demonstrated gaps in foundational supply chain procedures, skills and processes as well as challenges related specifically to logistics functions such as data visibility and transport. To address some of these, the project, in collaboration with the Malawi Ministry of Health (MOH), developed cStock, a routine logistics reporting system using SMS sent by health surveillance assistants (HSAs) to create greater visibility of stock levels at HSA work sites (village clinics) throughout the supply chain. Data from cStock is available on a web-based dashboard and made available to central and district level managers, program coordinators, and pharmacy technicians to diagnose, respond to, and prevent stock shortages and other supply chain weaknesses.

cStock, used as part of a team-based approach called Enhanced Management (EM), was successfully piloted in three districts in Malawi between 2011-2012. The project undertook a midline evaluation of EM/cStock and other interventions in Jan-Feb 2013 and disseminated the findings to the MOH and partners in May 2013. At this meeting, based on strong evidence from the midline evaluation, EM/cStock was endorsed for nationwide scale up and institutionalization. At the time of this survey 20 districts were actively using cStock, and all 29 districts of Malawi are expected to be using cStock in 2014.

Because decision-makers are already using data from cStock to make decisions about commodities in the community health supply chain, it is critical to understand the validity and accuracy of data provided by the system and to identify any underlying issues that need improvement. cStock system data comes directly from toll free SMS messages sent by HSAs each month with stock on hand (SOH) quantities for each commodity they manage. The same monthly data are also reported by HSAs through several different paper forms. By undertaking a Rapid Data Quality Assessment (RDQA), the project sought to assess the quality of data inputs to the cStock system, compare it with quality of data available from the traditional paper reporting system, and work to identify gaps that must be addressed in order to improve overall quality of the data sent by HSAs to the cStock system and data that HSAs report by way of the general paper-based system (namely Form 1A and LMIS-01G).

The assessment found that a slight majority of both cStock and paper reports assessed were of good quality, with minor or no data quality issues. However, more than a third of reports using both methods had major quality issues. The most common reason cited for data discrepancies in reporting, by cStock and Form1A (the most common paper reporting method), was failing to conduct a physical stock count either correctly or at all before compiling and sending reports. When asked why a physical count was so often omitted, the most common response was that the second key to the drug box (held by a community member) was not conveniently available at the time of reporting.

Key recommendations from the RDQA include emphasizing to HSA supervisors and HSAs that a physical count should be conducted by all HSAs at the end of the month. Another recommendation is strengthening regular supportive supervision on cStock while emphasizing physical count skills, such as excluding expiries from counted data, help in reducing math errors, typos and data entry problems to increase the quality of data entered into cStock.

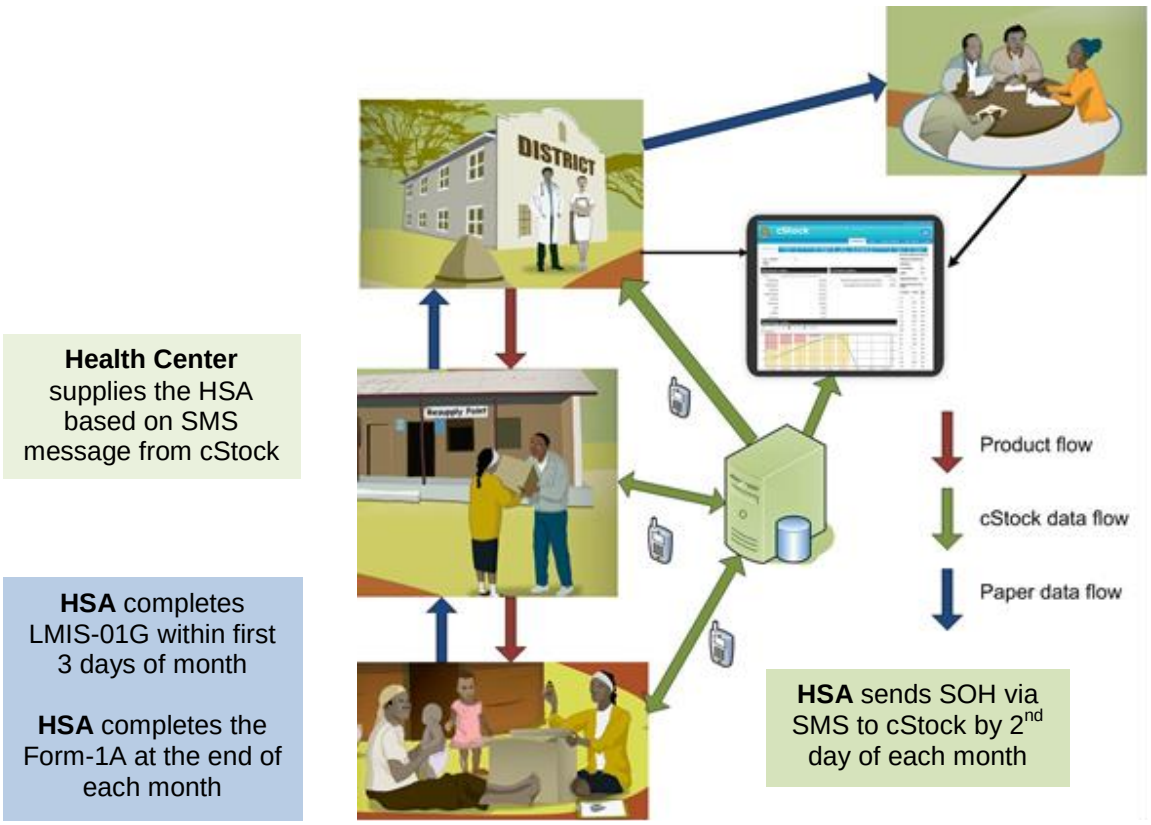
Background & Rationale

SC4CCM is a learning project focused on finding affordable, simple, and sustainable supply chain solutions that address the unique challenges of community health workers (CHW). In Malawi, baseline assessment results in 2010 demonstrated gaps in foundational supply chain procedures, skills and processes as well as challenges related specifically to logistics functions such as data visibility and transport. To address some of these, the project, in collaboration with the Malawi Ministry of Health (MOH), developed cStock, a routine logistics reporting system using SMS sent by health surveillance assistants (HSAs) to create greater visibility of stock levels at HSA work sites (village clinics) throughout the supply chain. cStock is part of an approach that SC4CCM designed and piloted, called the Enhanced Management (EM) approach, which aims to improve availability of medicines for community health programs by promoting superior team performance practices and the use of data to inform decisions and improve supply chain performance. There are two components of EM:

cStock (Data Visibility) – An SMS-based reporting and resupply system that improves communication between the HSAs and their resupply points. cStock also provides visibility of real time HSA logistics data at district and central levels of the Ministry of Health (MOH), such as alerts, stock out rates, and current stock status, enabling supply chain managers to respond immediately to issues. HSAs send their stock on hand (SOH) for all products via SMS to the cStock database by the 2nd of each month. The database uses this information to calculate the resupply quantity required by the HSA to top up to maximum stock quantity. cStock communicates the individual HAS's requirements to the health center (HC) supervisor and drug store in charge via SMS. HCs then pre-pack the orders and notify HSAs that orders are ready; HSAs then travel to the HC to collect their products. cStock generates more than ten supply chain indicators, and displays them as easy-to-use performance and feedback reports on a web-based dashboard that can be used by managers at district and central level for management and supervision.

The cStock system was designed to mimic the paper-based reporting system, which also has the HSAs reporting at the beginning of each month. The two paper-based reporting forms considered in this evaluation were Form-1A, which includes both service and logistics data for CCM service s and products, and LMIS-01G, which is purely a logistics form for all products managed by the HSAs. Both forms contain SOH at the beginning of month and are submitted to the HC.

Figure 1: cStock data workflow



DPAT (Structured Team Work) – District Product Availability Teams are teams comprised of district management, health facility staff, and HSAs who are responsible for ensuring that community health products are available at all times for HSAs to provide services to clients. DPATS promote a collective commitment, shared goals, superior team performance, and continuous improvement.

The combination of real-time data available through cStock and teams that use this data to monitor and strengthen the supply chain has proven effective in improving overall supply chain performance and strengthening oversight.

Figure 2: EM workflow

The MOH in Malawi is in the process of scaling up EM/cStock nationwide, and the system will be used in all 29 districts by 2014. Because decision-makers are already using data from cStock to make decisions about commodities in the community health supply chain, it is critical to understand the validity and accuracy of data provided by the system, and to identify any underlying issues that need improvement. cStock system data comes directly from pre-paid SMS messages sent by HSAs each month with SOH quantities for each commodity they manage. The same monthly data are also reported by HSAs through several different paper forms. By undertaking a Rapid Data Quality Assessment (RDQA), the project sought to assess the quality of data inputs to the cStock system, compare this with quality of data available from reports available through the traditional paper system, and work to identify gaps that must be addressed in order to improve overall quality of the cStock system and data that HSAs report by way of the general paper-based system.

Study goals and objectives

1. To verify rapidly:
    a. The quality of product availability (SOH) data reported by HSAs through cStock at select sites, compared with actual SOH on reporting day.
    b. The quality of SOH data reported by HSAs through cStock at select sites, compared with the quality of data reported by the HSA for the same period using traditional paper forms.
2. Provide immediate feedback to HSA and HSA Supervisor, based on data collected the day of visit.
3. Identify measures for strengthening the data management and reporting system and improving data quality, and relaying them to HSAs, HSA Supervisors, and higher level managers at district and central level for action.

Methodology

SC4CCM adapted the generic RDQA multi-indicator tool, developed and validated by the MEASURE Evaluation project, to understand the quality of data inputs to cStock and the routine paper reporting system. One key adaptation to the tool was omitting the systems assessment portion, as similar content was collected by the project midline evaluation in early 2013. The cStock RDQA also used many more site forms than a typical RDQA since the source of verification information was accessible only by visiting multiple small service delivery points and physically counting health products.

Data collection teams used a new site form at each HSA site (village clinic). The reporting period under review was December 2013 (i.e. November data reported before December 2). On each site form, teams worked together to record answers to a series of observational questions about available data sources, conducted a physical count to determine actual SOH on day of visit for selected products, and recorded the reported SOH from either a prepared LMIS-01G or Form1A. Teams also recorded number of units dispensed and received since the day each report was submitted to determine an 'accurate' SOH for the reporting day.

Finally, on site, data collectors calculated a verification factor (VF) for each SOH report made through cStock and paper reports by comparing reported quantity with the 'accurate' SOH for the reporting day. In RDQA methodology, cross-checks are generally performed by examining separate records documenting the information of interest (eg. quantities of drugs reported in the reporting period) to see if these numbers corroborate the reported results. In this case, collecting data to calculate VFs for paper report served this purpose, to cross-check data reported through cStock.

Data collectors reviewed the calculated VFs on site and asked follow up questions to better understand the root cause of inaccuracies found. The assessment sampled HSAs from six districts to get a sense of varying quality across districts.

Data Collection

Six teams of two data collectors each were assembled, where possible mixing members so that one team would include both a local pharmacy technician or Integrated Management of Childhood Illnesses (IMCI) coordinator, and a monitoring and evaluation (M&E) or health management information system (HMIS) staff with no regular interaction with cStock. Team members were not an even mix of pharmacy and non-pharmacy staff so some teams had two pharmacy staff. Data collectors did not visit their own districts. Teams were trained for three days prior to field work including a pre-test with HSAs near Lilongwe.

Teams traveled to the field the first week of December, visiting the associated HC first to check in with the HSA Supervisor, get directions to sampled HSA sites, and review relevant paper reports and registers for the reporting period. Teams began entering site form data for selected HSAs at the HC level and completed each form at the HSA level. Teams covered 2-3 HSAs per day, and required up to five days to complete data collection in assigned districts.

Selecting products

Each site form in the RDQA tool had space for up to four product reports per method (cStock or paper), and depending on the products managed by each HSA, there were up to seven CCM products to choose from at each site (Appendix A). The RDQA analysis was not intended to be product-specific because reporting processes are the same for any product using cStock or paper, so any of the seven products were eligible to be included in the RDQA as long as they met the selection criteria. The selection criteria were:

1) Must have a reported SOH value reported to cStock for December 2013, and

2) Must have a reported SOH value on a prepared paper form for December 2013.

If more than four products met the criteria, teams randomly selected products from the group. If exactly four products met those criteria, teams assessed entries for all four eligible products. If fewer than four products met these criteria, teams assessed all available products. For each HSA, the same products were reviewed for cStock and paper reporting.

Entering reported information

cStock reports with relevant SOH data were generated by RDQA supervisors for sampled HSAs before visiting the site. RDQA supervisors then relayed this information to the team for completing site forms. Teams entered data from the cStock SOH report directly onto the paper site form for the HSA before arriving at the site.

At the HSA site, teams looked for paper reports, prepared but not yet submitted, for the reporting period under review. Product data on prepared reports was considered reported data. Blank entries were not considered. If both Form 1A and LMIS-01G were available with reported data, data collectors were instructed to use the form that was completed closest to the date of team visit to the site, to maximize accuracy of the 'accurate' SOH calculation, and the overall verification factor calculation.

Entering data on units dispensed

In order to calculate the most accurate verification factor possible, teams consulted information sources such as cStock and records at HC and HSA to determine quantity of products both received or dispensed since the day the December report was prepared. This was done separately for cStock and paper reports, given the possibility that they were prepared on different days. Where information from these sources was incomplete or did not exist, teams entered 'ND' for No Data.

HSAs are trained to send a receipt message to cStock when they receive a new quantity of product. If cStock logged a receipt since the date the HSA prepared their December report, teams recorded this quantity on the site form. Teams also asked the HSA Supervisor permission to check their Resupply Worksheet (RSW) at HC for recent entries to verify the cStock receipt or as a secondary data source if an HSA did not send a receipt to cStock. The receipt value was then deducted from the team's physical count to help determine an 'accurate' count on the reporting day for each product.

Teams also reviewed the village clinic register (VCR), a standard book where HSAs document the cases they have seen and treated, to count number of treatments dispensed since the date the report was prepared, for all products assessed. This value was added to the physical count to complete the 'accurate' count on the reporting day for each product.

Quality Assurance

In the field

- Quality of data in client registers was not the subject of this assessment but was a factor that affected the accuracy of the VF calculations. In order to reduce the difference between reported SOH and physical count made on day of visit, teams attempted to visit sampled HSAs as close as possible to the day and time of actual reporting. They also chose products for which complete client register data were available over products where none were available.
- Roving RDQA supervisors were assigned two teams each for the field work period and traveled with one at a time but made contact with both teams daily.
- Data collection teams had a binder to keep paper forms safe during field work.
- RDQA supervisors filled a quality checklist to be handed in at the end of data collection.

Sampling

This RDQA visited a total of six districts. Districts were purposefully selected with a minimum two months experience using cStock and for variety in terms of geography and partner support.

Assessment districts were:

- Three "original" EM/cStock intervention districts, where users have 12 or more months experience using cStock plus DPAT (ie. the full EM intervention): Nkhohtakota, Nsanje, and Kasungu.
- Three "new" EM/cStock districts, where users have less than 12 months experience using cStock and less than three months using DPAT (ie. the full EM intervention): Mzimba N, Ntchisi, and Phalombe.

A total of 60 HSAs were selected, ten per district, using the following procedure:

- SC4CCM assembled a list by district of HSAs who manage four products or more, and who reported to cStock within the first seven days of October 2013 to ensure they are active users.
- Five HCs were selected per district at random, using probability proportion to size (PPS), where "size" is defined as the number of products managed by an HSA.
- Two randomly selected HSAs who reported to cStock by the time of the team's visit (Dec 2-6) were then selected for each selected HC, for a total of ten HSAs per district.
- SC4CCM sent advance notice of the activity to selected HCs. Before departing for the field, teams reached out to HSA Supervisors at associated HCs to notify them of an upcoming visit (without giving specifics of the activity and introducing bias).

- Teams contacted their RDQA supervisor the evening prior to visiting each HC to request requisite HSA report information for starting to fill the site form.
- If a selected HSA had not reported to cStock for December 2013 by the time the data collection team arrived at their HC, the next HSA listed from the same HC, who had reported from cStock, was selected as a replacement.
- If no HSA from the HC had reported to cStock for December 2013 by the night before the team's visit, the team selected the next closest HC on the list with HSAs that met the criteria.

Summary of Sample Achieved

- Teams visited a total of 60 HSAs across six districts, and reviewed up to four product SOH reports per reporting method per HSA for the December 2013 reporting period.
- Verification factor data points collected to assess SOH reporting through cStock across six districts: **n=240**, 100% of a possible 240.
- Verification factor data points collected to assess SOH reporting through paper reporting across six districts**: n=228** (12 missing, no Form1a prepared), 95% of a possible 240. Loss was due to several HSAs without a prepared Form1A at the time of visit.

Data Management and Analysis

Data Management and Data Entry

- Each team was provided sufficient printed site forms for sampled HSAs in their district. Teams were responsible for maintaining filled forms in a provided binder and keeping them in good, legible condition.
- Teams communicated with RDQA supervisors by phone prior to arriving at HC to receive necessary cStock data to fill the site form.
- Supervisors checked each form submitted and signed each one before sending to headquarters for analysis.
- A data entry clerk entered VFs into a central Excel that aggregated data across six districts.

Analysis

The first level of analysis happened onsite with each HSA. Data collection teams calculated two VFs per selected product. The first compared the 'accurate' figure (ie. physical count, plus number of treatment(s) dispensed since cStock report was submitted, minus new receipts) with the cStock reported figure; the second was the same but for the paper report. VFs determine the accuracy of reported data within a level of acceptability of +/- 10% of the 'accurate' figure for each product. When zero was found on both sides of the equation, the VF value was changed to 100% because figures matched as expected. Feedback was given to the HSA and HSA Supervisor based on the VFs calculated for the visit. Each VF was treated as a unique data point in the analysis, up to eight per HSA.

In mid-December 2013, records were entered and cleaned (VFs checked for accuracy, outliers identified) and the full analysis was conducted. VFs were aggregated for each group (original and new districts) into separate files, as well as one aggregated file and simple descriptive analyses were done in Excel.

Limitations

- One HC was replaced because none of the associated HSAs were available during the week of the team's visit; 11 HSAs were replaced by the next on the list due to non-availability on day of visit.
- Across all data points collected through this activity, a total of 11 data points in the cStock records and 12 data points in the paper reports were considered outliers (500% or above), which represented 5% of each group. For the purpose of making balanced calculations of median, average and mode, outliers were not dropped, but reduced to 500% (i.e. still considered very poor quality).
- A total of four data points in the cStock records and five data points in the paper reports were negative numbers, which represented 2% of each group. For the purpose of making balanced calculations of median, average and mode, negative numbers were changed to zero (i.e. still considered very poor quality).
- 18 HSAs visited were missing a data source to track products received and/or dispensed.
- In fewer than ten cases, the real difference between counted and reported quantities was only a few items, but the small unit numbers caused the VF to reflect very poor quality data.

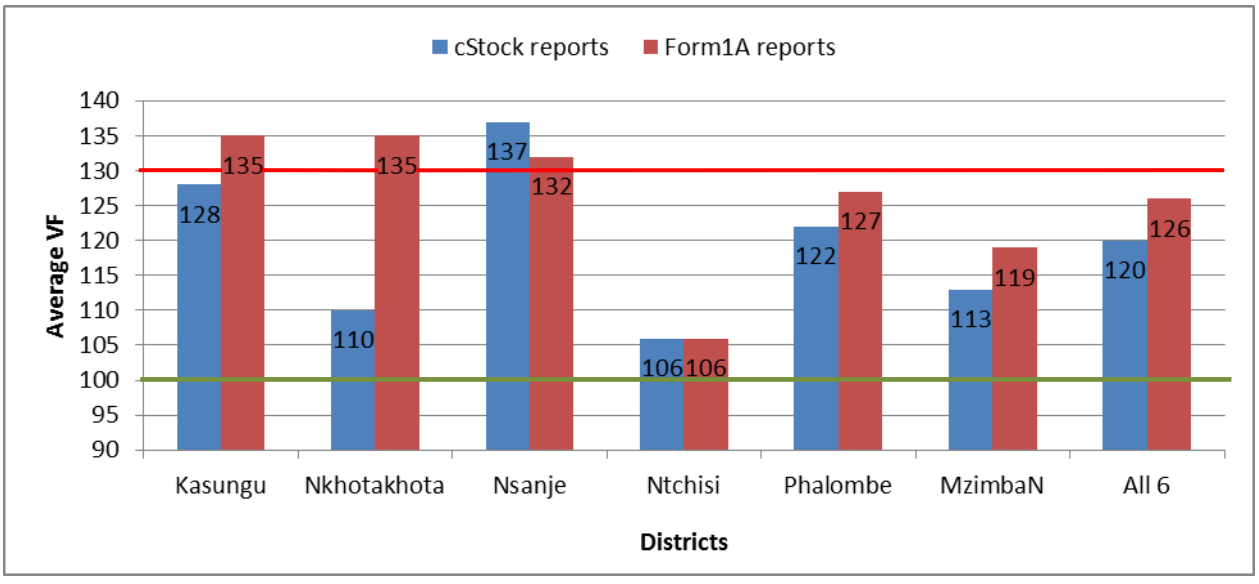
Summary of Findings

The cStock RDQA reviewed a total of 468 VF data points across six districts, to rapidly verify SOH reports made by HSAs through cStock and paper, for December 2013. The general observation made by teams from pilot and actual data collection was that completed Form1A turned out to be more prevalent than completed LMIS 01G forms (no statistic available). Therefore, the Form1A was used exclusively as paper reporting data source for this activity.

A VF of 100% represents the highest possible quality score, where the reported SOH value matched the product count exactly. Quality decreases as the numeric value veer away from 100%, either higher or lower, until data quality is considered to be poor when less than 70% or higher than 130%. The **median value**, which separates the higher half of the population from the lower, was 100% in all districts, and the most common value, **the mode**, was also **100%** in all districts.

Figure 1 shows averages for cStock and paper (Form1A) reports for the original and new EM/cStock districts, as well as the average across six districts. The green line indicates a perfect score of 100% and the red lines marks 130%, where any score higher is considered poor quality data. The closer the bar height to the green line the better the score. Averages varied by district and by reporting type, with slightly better performance in the new EM/cStock districts that were trained more recently. The overall average VF was slightly more favorable for cStock than for paper reporting.

Figure 3: Average Verification Factors, for total districts and district groups



To describe verification results in terms of quality, the cStock RDQA used a classification system previously recommended by MEASURE Evaluation project. The summary of RDQA results using this rating scheme is provided in Table 1 and Figure 2. A perfect score was achieved by almost a third of the sample in the six districts, slightly more so for the new EM/cStock districts than for the original, again suggesting potential for quality reduction over

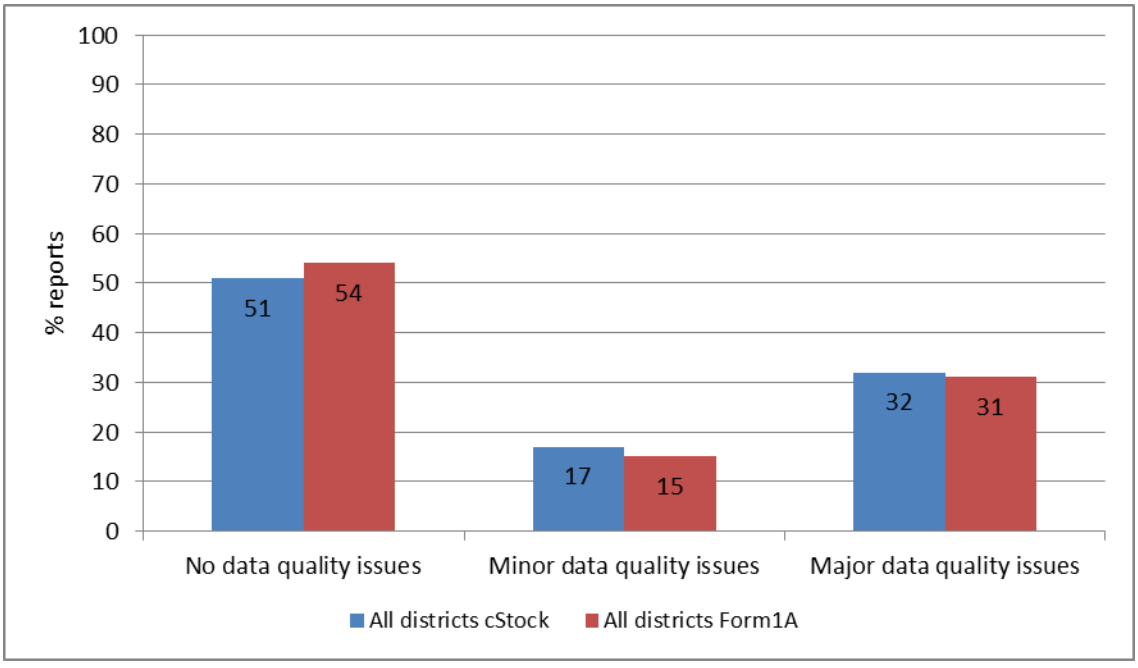
time. Another portion had negligible or insignificant data quality issues, which adds to about half the sample when combined with the perfect score records. Minor quality issues were found in about a quarter of reports reviewed. However, approximately a third of reports assessed in all six districts were found to have major data quality issues.

Table 1: Verification Factor Classification

	(% of SOH reports)					
	Original EM/cStock districts (3)		New EM/cStock districts (3)		All districts (6)	
	cStock (n=120)	Form1A (n=108)	cStock (n=120)	Form1A (n=120)	cStock (n=240)	Form1A (n=228)
Perfect score VF = 100%	28	28	31	34	29	31
Negligible data quality issues VF 90-99%; 101-110%	20	21	24	24	22	23
Minor data quality issues VF 70-89%; 111-130%	19	16	14	13	17	15
Major data quality issues VF below 70%; above 130%	33	35	31	28	32	31
Total	100	100	100	99*	100	100

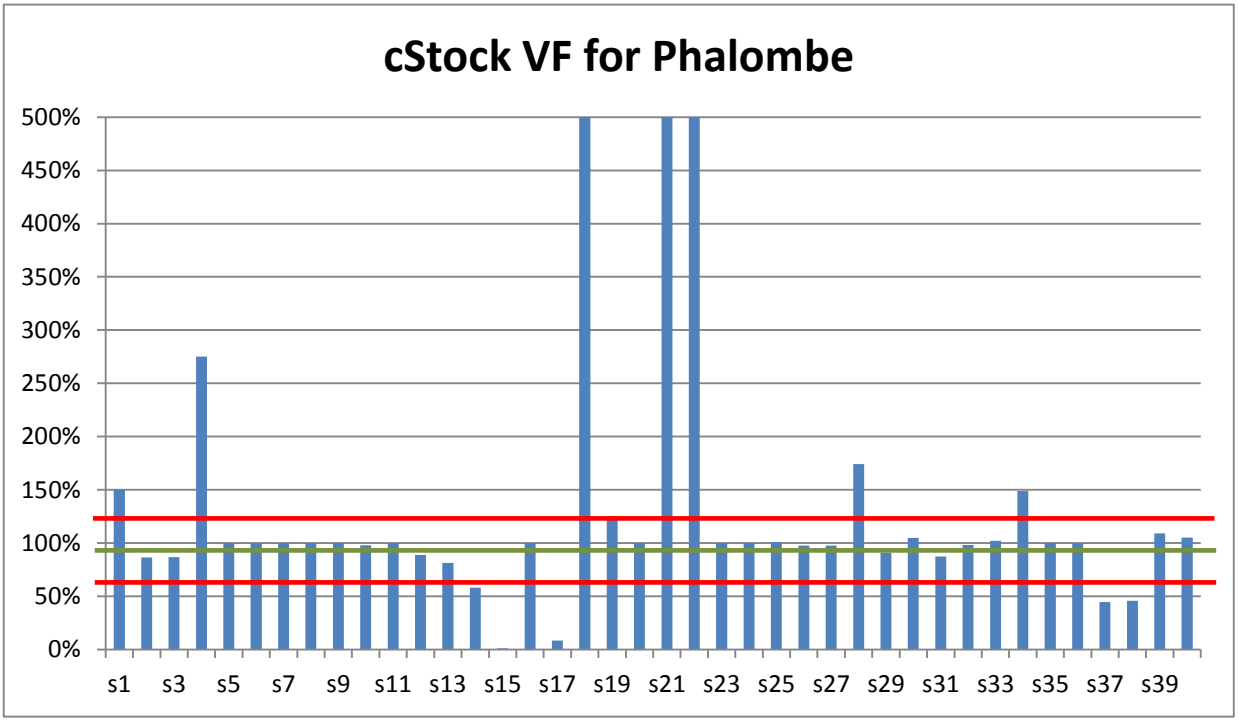
**Figures may not add to a total 100% due to rounding*

Figure 4: Verification Factor Classification, All Districts



Because this RDQA visited so many individual HSA sites, it is not useful to show the traditional RDQA bar graph with every VF value collected. However, a graph of cStock VF values for one district, Phalombe, is provided in Figure 5 to show the variations for a relatively average district. Many of the sites have a VF within the red lines (indicating minor to good data quality), falling close to the green line for 100% or perfect score. But those reports that fall outside the red lines are considered poor quality data.

Figure 5: cStock VF for HSA sites visited in Phalombe district



Qualitative summary

HSAs often prepare the Form1A and cStock reports at the same time, since their reporting deadline is very similar and the same information is required. For this reason, they often use the same information to prepare both reports, which explains why RDQA results track fairly close for both reporting types. The most common reason cited for data discrepancies in reporting, using cStock or Form1A, was **failing to conduct a physical stock count either correctly or at all beforehand**. This was true for cStock and paper reporting almost equally, with only a few more mentions around cStock. When asked why a physical count was so often omitted, **the most common response was that the second key to the drug box (held by a village health committee member) was not conveniently available at the time of reporting**. For some products that are loose and difficult for HSAs to count while maintaining the quality of the product, HSAs are advised to estimate the quantity they have in stock, so it is likely that this appropriate practice leads to data discrepancies for products like Cotrimoxazole 480 mg (CO).

Most products observed in this assessment, however, are packaged such that a physical count is possible.

Other themes that emerged which generally affected both types of reporting (cStock and Form1A) were:

- Poor recording/reporting (ie. failing to regularly record information, or recording or reporting incomplete or incorrect information)
- Counting expiries as part of reported SOH
- Page summary errors on the VCR, the primarily source of information when a physical count is not done (related to poor recording/reporting)
- Artemether Lumefantrine 1X6 blisters (LA) substitution issues (ie. HSAs report SOH for LA based on how they use the product, not on how it is packaged and tracked in logistics records)
- Arithmetic errors
- Typos made when entering data
- Over-reporting deliberately to receive more product

Discussion

Considering the high number of poor quality records, the study team explored several angles around the cStock reports in particular, hoping to understand more about the root cause(s) of these results. Although the RDQA was not set up for a product-specific analysis, the study team reviewed poor quality reports to cStock by product to understand if there was a trend related to product type. Data quality issues were found with all seven products assessed (OR, TE, ZI, LA, LB, CO, and PA [see Appendix A]) across the six districts. The study observed that data quality errors were common for the two formulations of Artemether Lumefantrine (LA and LB [2x6 blister]).

Poor quality reports came from 16 of the 30 HSAs visited across the three new EM/cStock districts. Of those, 75% had more than one data quality issue among the four products assessed. The frequency of over reports in the group was 35/228 (15%), and under reports was 25/228 (11%), showing an almost equal likelihood or either type of error. Similarly, in the three original districts, poor quality SOH reports came from 22 of the 30 HSAs visited; of those, 64% had more than one data quality issue among the four products assessed. In these original districts, the number of over reports was 35/240 (15%), and under reports was 32/240 (13%). These observations suggest similar reasons behind poor quality reporting in all six districts.

Based on the qualitative comments, we know more about the root causes of the quality issues. HSAs are skipping an important step that has the potential to greatly improve data accuracy, which is performing a monthly physical stock count before reporting. A barrier to conducting the physical inventory has been difficulty in accessing the drug box as it is policy that a village health committee member holds one key to the drug box (HSA holds the other), which is a policy that HSAs must follow in Malawi. This committee member is not always available at the time the HSA is preparing the reports and so s/he cannot access the drug box to do the physical count. While the page summaries from the VCR may give close to accurate information for reporting purposes, HSAs need to review their stock to check for damages, expires, losses, etc. which will all affect accurate stock count reports.

Another issue that came up through the data was that HSAs use a special system to report Artemether Lumefantrine, and it is unclear whether this is standardized. Some HSAs report LB as LA because they divided the LB to treat younger children. The result is that data in cStock may not show a picture that reflects the real stock status on the ground.

The RDQA results show that while the majority of HSAs sampled in all six districts are reporting fairly accurate data through both cStock and Form1A, there are still quality issues that need to be addressed for both methods of reporting. In any information system, perfect accuracy is rarely achieved, so it was encouraging to see as many as 34% of data points collected (by way of cStock and Form 1A) with a perfect score. However, 23-30% of data points collected were categorized as very poor quality data, across both groups and methods of reporting, raising a red flag in terms of using this data for decision making. **It is clear that measures must be taken to improve data quality**, especially so that managers can feel confident to use cStock data to make the most appropriate and effective data-driven management decisions to improve community supply chain performance.

Recommendations

- Physical count must be conducted by all HSAs each month, and for cStock this count should be done the first two days of the month, not the end of the month. This could be addressed through two means:
  1. HSA supervisors should emphasize importance of conducting an actual physical count of each individually packaged product managed, every month during supervision and DPAT meetings. (Observe existing policy to estimate count of loose drugs only)
  2. HSAs should coordinate with the village health committee member who holds the second key so they are present at the time of reporting and participate in the physical count. If necessary, HSA Supervisors should work with HSAs to address this barrier by facilitating a discussion with the village health committee.
- Strengthening regular supportive supervision on cStock and proper reporting may also help reduce math errors, typos, and data entry problems.
- We recommend that stakeholders in-country discuss and agree clearly on how LA substitutions should be handled in terms of recording and reporting, and develop clear messages to HSAs and supervisors to enforce good practice. Since LA substitution could also be happening at higher levels of the system, stakeholders need to look at this problem holistically and provide guidance accordingly to ensure greater accuracy of data in the logistics management information system.

Appendix A: List of CCM Products

1. Cotrimoxazole 480 mg (co)
2. Artemether Lumefantrine, LA 1x6 (la)
3. Artemether Lumefantrine, LA 2x6 (lb)
4. ORS (or)
5. Paracetamol 500 mg (pa)
6. Tetracycline eye ointment (te)
7. Zinc 20 mg (zi)

Appendix B: Assessment Team and Contacts

Name	Place of Work	Title	Telephone	Email
Gabriel Chipeta	Nkhata bay	IMCI Coordinator	0888582150	gabriel.chipeta@yahoo.com
Rumbani Mughogho	Kasungu	EHO/Deputy IMCI Coordinator	0888346457	rumbamughogho@yahoo.com
Sydney Paul	Mulanje	EHO	0888700526	sydneypaul@live.com
Prosper Mbemba	Kasungu	HMIS Officer	0888854292	prospermbemba7@yahoo.com
George Golosi	Ntcheu	HMIS Officer	0888148728	ggolosi@yahoo.co.uk
Bernadette Chibwana	Zomba	Pharmacist	0888599673	bechibwana@gmail.com
Nelson Nanchinga	Thyolo	Pharmacy Technician	0999459088	nnanchinga@yahoo.com
Bosco J. Sinkonde	Mzimba South	IMCI Coordinator	0999181049	boscosinkonde@yahoo.com
Zione Kamoto	Lilongwe	IMCI Coordinator	0995766008	kamotozione@yahoo.com
Michael Lemeka	Nsanje	Pharmacy Technician	0888876629	michaellemeka@gmail.com
Laston Kamwana	Nsanje	EHO	0888519255	lastonkamwana@gmail.com
Roy Makaika	Lilongwe	Logistics Officer	0999206106	rmakaika@gmail.com
Boniface Chimpanga	JSI	Logistics Officer	0999615809	bchimphanga@jsimw.com
Sellah Moyo	Mzimba North DHO	IMCI Coordinator	0888890248	sellahnkowani@yahoo.com
Charles Chimenya	MOH- HTSS Pharmaceuticals	Logistics Pharmacist	0992117070	charleschimenya@yahoo.com

References

[1] Measure Evaluation's Data Quality Assurance tools can be accessed online here: http://www.cpc.unc.edu/measure/tools/monitoring-evaluation-systems/data-quality-assurance-tools