Strengthening Supply Chains at the Community Level

FINDINGS FROM THE SC4CCM PROJECT IN MALAWI, RWANDA AND ETHIOPIA

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In 2009, the Supply Chains for Community Case Management (SC4CCM) project, with funding from the Bill & Melinda Gates Foundation, set out to increase availability of key medicines and commodities for treatment and management of sick children at the community level in three sub-Saharan Africa countries: Malawi, Ethiopia and Rwanda. The underlying hypothesis was that bottlenecks hindering continuous product availability among community health workers (CHWs) existed primarily between the community level and its resupply point, and that solving supply constraints at the community level would yield significant improvements in integrated community case management (iCCM) program effectiveness, coverage, and scale. The project goal was to demonstrate that it is possible to overcome supply chain constraints that prevent effective community-based treatment of common diseases of childhood with affordable, simple, and sustainable supply chain solutions that address the unique challenges faced by CHWs. The project was further tasked with demonstrating that these innovative solutions could be taken to scale and were feasible to sustain by countries after the project ended.

The emphasis of SC4CCM was on the lowest levels of the supply chain, focusing on testing, learning, and turning evidence into widespread practice. Specifically, we aimed to learn about successful implementation as well as how to increase the potential for scale-up, institutionalization, and sustaining the interventions and their effects. To this end, baseline assessments of community health supply chains were conducted in all three countries in 2010, midline evaluations in 2012-13, and endline evaluations in 2014. Baseline findings focused on identifying community supply chain bottlenecks. Midline evaluations focused on demonstrating the positive, measurable effects of tested interventions, and findings were used to identify scale-up packages and kick-off the scale-up process. Endline evaluations focused on identification of lessons learned in implementation in original pilot and new districts, and factors that contributed to or adversely affected scalability, institutionalization, and sustainability of the SC4CCM interventions. The baselines consisted of a health facility-based survey to assess supply chain performance. Midline and endline evaluations used carefully designed mixed methods, with facility-based surveys at both midline and endline, focus groups at midline, and qualitative case studies at endline. The midline results showed the potential for each intervention if implemented in the "ideal manner," namely with significant project support and time to mature, whereas the endline results reflected the interventions as implemented over a shorter time period and supported less intensively by the Ministries of Health (MOH) and partners, with limited project involvement.

This report includes results from all three evaluations to show the progression in the project's understanding of successful community level supply chain practices over the course of five years. The report also includes an addendum, called *Lessons Learned for Implementers*, that outlines practical tips and solutions to further aid those who wish to use these findings and to make their work successful and sustainable.

KEY FINDINGS FROM THE SC4CCM PROJECT

The SC4CCM project experience demonstrates that it is possible to remove supply chain constraints at the community level, transform supply chain practices to strengthen and improve supply chain performance, and even significantly improve product availability at the community level when products are present in the overall system. Based on the project's achievements in removing supply chain constraints at the lower level of the system, this report presents evidence about what works in the form of five key findings that emerged from the five year span of the project. The report also provides recommendations for countries and implementers working to strengthen community supply chains based on these findings. While we discuss these separately for the sake of clarity, a major finding from our implementation experience and multiple evaluations is that these findings and recommendations are all interrelated, and should be considered together rather than individually when endeavoring to improve community supply chains. The five key findings are:

1. Simple, streamlined, demand-based resupply procedures (RSPs) for the community level, customized for the context, provide the basis for regular, functional and efficient resupply in the presence of community products.

2. Multi-level quality-improvement (QI) teams can improve communication and coordination between staff at different levels, reinforce the correct and consistent use of RSPs, monitor supply chain performance, and take action to address supply chain problems and bottlenecks, but depend heavily on the critical engagement and leadership of district and health center (HC) level staff to prioritize regular team meetings and action-taking.

3. Visibility of appropriate and timely community logistics data at both HC and district levels is a prerequisite for managers and QI teams to regularly monitor the supply chain and respond in a timely and targeted way. Implementing an SMS and web-based mHealth system, where data are transformed into relevant, usable reports, can significantly improve timely, accurate availability and

usability of community health logistics data at all levels of the supply chain.

4. Multi-level QI teams show promise in removing supply chain obstacles and creating a customer-oriented approach focused on the community level, but require significant start-up effort and on-going support, and cannot be effective in the long term until other contextual factors in the health system are addressed, such as competing staff priorities, chronic under-staffing, low support for supervision, long distances to meetings, etc. which pose barriers that prevent teams from working well.

5. Because the community is located at the last mile of the supply chain, despite successful, focused intervention implementation at lower levels, and achievement of intermediate supply chain outcomes, sustained progress towards improving product availability of health commodities at community level is not possible without dependable national level availability and a supply chain that facilitates efficient movement of community products to resupply points and data to and from all levels of the system.

Following on this last point, evidence from the project's final phase also confirms accepted wisdom from the supply chain community that enhancing supply chain practices and performance at the lowest levels of the supply chain alone is not sufficient on its own to improve product availability among CHWs[1]; sufficient products must be available at the national level to accommodate CHW needs and the entire supply chain needs to function effectively and be able to deliver products to the resupply point when needed. While this is not necessarily a new finding, the SC4CCM project experience explicitly debunks assumptions made at the time

[1] Supply Chain Models and Considerations for Community-Based Distribution Programs: A Program Manager's Guide, John Snow, Inc. and the Reproductive Health Supplies Coalition, 2010.

What It Takes To Ensure Medicines for Children Are Available In The Community

Drivers of community product availability

National quantification and coordination conducted regularly using CHW logistics data

Funding available and procurement follows supply plan, resulting in sufficient products in pipeline to accommodate community health needs

Product flow and data flow are aligned at all levels of the supply chain leading to the national supply chain being able to deliver consistently to the health center, informed by CHW logistics data

Multi-level QI teams meet monthly, use data for performance monitoring, problem solving, action planning and recognition

Disaggregated CHW logistics data available and visible for decision making

Correct and continuous use of simple, streamlined demand based resupply procedures

Customer oriented community health supply chain with CHW, health centers, and district staff empowered and motivated to be solution oriented

Supply chain preconditions above health center level

Community level supply chain practices

Supply chain data visibility

DISTRICT

RESUPPLY POINT

data

data

BIN CARD

CHWs have continuous availability of quality usable medicines to treat kids under five whenever needed

of project design and execution that the key bottlenecks to product availability exist mainly between CHWs and their resupply points. SC4CCM's mandate was limited to improving supply chain practices between HC and CHW levels, which did not enable the project to influence funding or procurement of sufficient products, or tackle improvement of supply practices to align product and data flow at higher levels of the system. Our evidence showed that key drivers of product availability at the CHW level included sufficient national levels of community health products and an effective supply chain above the HC level, and that the inability to address these two important areas of constraint had an effect on CHW product availability, despite the significantly improved supply chain practices at the CHW level.

DESCRIPTION OF FINDINGS AND SUPPORTING DATA

In this section, we present supporting data for the five key findings, as well as associated recommendations.

1. Simple, streamlined, demand-based resupply procedures (RSPs) for the community level, customized for the context, provide the basis for regular, functional and efficient resupply in the presence of community products.

The SC4CCM project found that community-level RSPs: a) ensure that product and data flows are aligned with those of the resupply point, b) provide structure on how, when and how much product should be supplied, c) clarify roles between the CHW and resupply point, and, d) optimize inventory levels to minimize stockouts and overstocks. With RSPs in place, CHWs and managers realize benefits such as improved transparency, accountability, time efficiency and organization of supply chain work, and better, timely data for informed decision making. For this range of benefits to be realized, RSPs have to be designed effectively – in the SC4CCM context, this mean that RSPs were simple or simplified – streamlined to fit in existing structures and processes, and demand-based.

In two countries, Malawi and Rwanda, the community-level resupply process or procedures were designed by the SC4CCM project in collaboration with the MOH and other partners in country, while in Ethiopia, RSPs had been designed but not implemented at the community level. In Malawi, while a demand-based, manual resupply system existed, it was not functioning well. SC4CCM designed an mHealth reporting and resupply system (cStock) to mirror processes in the existing resupply system, while also improving data visibility and improving product flow using

a streamlined resupply process. In Rwanda, standard RSPs were developed that use minimum data elements, provide simple tools to ease the burden of difficult calculations and align with the monthly meetings at cell and HC level. In Ethiopia, the Integrated Pharmaceutical Logistics System (IPLS) was already designed, but not yet implemented at the community level.

ALIGNED PRODUCT AND DATA FLOWS, AND A STRUCTURED PROCESS FOR SUPPLYING PRODUCTS

RSPs provided rules using predetermined maximum stock levels to calculate resupply quantities based on consumption, **taking the guesswork out of resupply and promoting transparency in how CHWs were being resupplied with products.** RSP tools for CHWs were effective because they were simple, streamlined and aligned with higher levels to reduce potential and existing inefficiencies. In all three countries, the project worked to ensure CHW data went to the persons who directly resupplied them, that the tools collected the minimum data required to make critical supply chain decisions and that resupply processes were aligned to regular activities, such as monthly meetings or collecting salaries.

"If the [CHWs] are filling out the reports correctly, we know the stock status and consumption. We know how much the HC and the health posts need, and we can send an accurate RRF [resupply request form] to PFSA [the regional warehouse/distribution point]. It's better for the [CHWs] and for the communities they serve, because there are no stock-outs. The [CHWs] also know when their products expire."

– HC Director, Ethiopia

"[Prior to RSP implementation] it was jungle law and often many CHWs went away empty-handed. The quick ones took away too many drugs, which kept expiring in the community…As a result of all this confusion, [we] were in constant conflict with pharmacy staff…now… total harmony reigns between us and the pharmacy staff. No unnecessary drugs are expiring."

– CHW Supervisor, Rwanda

"Ya, things have changed. Apart from the problems I've already identified. Now [CHWs] come at said time, not at random times. Also, the Village Clinic Managers use the products efficiently because the machine calculates and he also knows that he can't come to the HC several times a month to get more products. He is supposed to come once a month, or twice, if he has an emergency request."

– HC In-Charge , Malawi

IMPROVED CLARITY OF ROLES AND RESPONSIBILITIES

Intervention participants in all three country contexts identified **clarity of roles and responsibilities** as a benefit of the intervention. The implementation and operationalization of structured resupply processes assigned clear roles and responsibilities for supply chain reporting and resupply, clarifying expectations and contributing to the regularization of the process. SC4CCM found that CHWs were already linked to the program supervisor, but often not to the drug store or pharmacy staff that managed their resupply, and that this connection needed to be made explicit for community-level supply chain reporting and resupply processes to work effectively.

"Now, the health center staff and the [CHWs] know that the health post requests medicines based on consumption, through their reports. So, when the [CHWs] don't receive what they've requested, they ask questions. I'll go to the woreda [district office] and ask for the products, or else the HC will try to buy it through healthcare financing. We understand the problems, so we're better able to solve them."

– HC Store Manager, Ethiopia

"With RSP training we know which responsible person among HC staff who should give us products instead of asking whatever HC staff we found in the HC compound or the HC Titulaire."

– Senior CHW, Rwanda

"cStock is like a guide. It tells you a, b, c, d…Ya, in that sense that it acts like a guide to us. In the past, there was no system. We were doing things blindly. For my colleagues too, it's a guide."

– HC In-Charge, Malawi

GREATER TRANSPARENCY AND ACCOUNTABILITY

The SC4CCM endline case studies showed that **transparency and structure provided by the RSPs was appreciated by users at all levels and resulted in shared accountability and more proactive behavior** in all three countries. Users at all levels in all countries reported that the improved transparency and structure gained through the RSPs also increased the general sense of accountability for ensuring community products were supplied properly.

"We have changed our attitude. We plan for logistics now. Before, we used to just sit and wait for products to arrive. Now, we know how much stock we have and we can request products accordingly. Solving the problem of logistics is solving all the problems of

the health sector, including the problems of service delivery. Now, there are regular reports from health post, HC, woreda [district]. Before IPLS, the reports were disorganized but now, it is better."*

– Zonal Health Officer, Ethiopia

"The RSP process is helpful, it helps structure the supply chain. It helps also to properly follow up with the use of medicines by CHWs. So with this approach, even CHWs make efforts to correctly use medicine because they know someone is checking. With these positive aspects, it has helped the CHWs to provide care to sick children, so they are not obliged to come all the way to the health center, and they can get treatment close to home."

– HC Staff, Rwanda

"At first, I did not know that cStock keeps a record of the information that you send, so that when you have a review meeting, what you wrote could be shown. The system is able to detect those [CHWs] that send in reports late, those that do not send emergency orders. I also learned that the dashboard shows if you have kept drugs for a long period, and they even told us that there are some review at headquarters where they are able to pin point who has been active because they are also able to see from our dashboard. [This is how] it [cStock] has improved the way I work in the village clinic."

– CHW, Malawi

"cStock has improved our relationship because we can sit together and look at the data. They know why I'm giving them that quantity. There's transparency and accountability. And the involvement of [CHWs] has assisted me, because they're also treating patients, not just me. So my workload has been reduced."

– HC In-Charge, Malawi

GAINS IN EFFICIENCY IN TIME AND AROUND PROCESSES, OPTIMIZED INVENTORY LEVELS

Users of the RSP at community and HC levels in all three countries experienced and reported **positive gains in time use and efficiencies and a less burdensome process**, especially at the CHW and HC levels. Users at all levels in all countries also consistently reported that the RSP gave a sense of order to a process that was previously often characterized as chaotic. In addition, the RSPs provide a **specific process for calculating resupply** that helps CHWs maintain appropriate stock levels. And overall users felt that the RSPs gave job satisfaction due to clear expectations and direction as to what to do, resulting in increased motivation to manage their products well.

"Before IPLS, we went to the HC every time one medicine would finish. Now with HPMRR [Health Post Resupply and Report], the HC can see the balance of medicines that I have and supply me with it before I am out of medicine. Before, we had to go to the HC often, almost weekly, to get different medicines that finished each time. Now it saves us energy because we get medicines we ask for. We ask for it one time when we submit our [monthly] reports."

– CHW, Ethiopia

"These procedures [RSP] are good for us, it has helped to harmonize the way of requesting products and shortened the time we used to spend in waiting to get products... It has improved our relationship and collaboration with the HC staff."

– Senior CHW, Rwanda

Is it better for CHWs to use their phones?

"To them, it's easier. When they have a stockout, instead of having to come here, they just send an SMS and we prepare their products."

–HC Pharmacist, Malawi

RECOMMENDATION:

To gain time use efficiencies, increase transparency and accountability for community products, and clarify roles and responsibilities for supply chain management at the community level, simple, streamlined, demand-based RSPs customized to the context should be introduced at the community level.

2. **Multi-level quality-improvement (QI) teams can improve communication and coordination between staff at different levels, reinforce the correct and consistent use of RSPs, monitor supply chain performance, and take action to address supply chain problems and bottlenecks, but depend heavily on the critical engagement and leadership of district and HC level staff to prioritize regular team meetings and action-taking.**

Country results demonstrated that training on RSPs alone is not sufficient to ensure that they are correctly implemented and the data gets to where it is needed. Even when they are simple, RSPs need a mechanism for reinforcing their correct and consistent use, and for ensuring managers use data to monitor supply chain performance and take action to address supply chain problems and bottlenecks. Supporting RSPs at the community level with multi-level QI teams can lead to significant and measurable improvements in key supply chain processes at the community level, contributing to improved product availability.

In all three countries, the project supported implementation of QI teams, although the approach varied by country. Ethiopia incorporated many elements of the QI model into existing monthly meetings, leading to better use of RSPs through problem solving and action planning, although the model was not driven by the use of data, which was not available for that purpose. Table 1 gives an overview of the three models across the countries, highlighting areas of commonality, including: existence of a shared supply chain-related goal or objective, regular meetings, a structured approach to problem solving, taking action to address supply chain problems, and recognition of CHW achievements. To be effective, the project found that QI teams need to include both programmatic and supply chain staff from multiple levels. Creating a forum where CHWs, HC staff, and districts could come together around a common purpose to discuss supply chain challenges and accomplishments opened up channels of communication and built trust; by providing a structure and process for the routine use of data, problem solving and action planning, teams could be proactive and productive, learn from each other and be recognized for their achievements, all highly motivating factors, especially for CHWs. District participation in QI teams provided an avenue for the community level and HC staff to escalate issues that could not be solved at the lower levels. In addition, through participation in the QI teams, district staff were able to coach HC staff to resolve more complex problems, especially around issues of product availability, such as overstocking, emergency orders and impending and long term stockouts.

Table 1 – Characteristics of QI Approaches Across Three SC4CCM Project Countries

	Ethiopia	Malawi	Rwanda
Multi-level team meetings	Mandatory monthly meetings for general purposes with: HC head , HC pharmacy staff, CHW supervisors, CHWs	Intervention-specific, quarterly meetings at district level with program coordinators, pharmacy staff, cluster supervisors. Intervention-specific monthly meetings at HC level with cluster supervisor, HC In Charge, CHW supervisor, CHWs	Intervention-specific monthly meetings with: Senior CHWs (experienced CHWs that oversee 10-12 CHWs). HC pharmacist, HC CHW Supervisor, and HC Data Manager. District coaches – District CHW Supervisor, District Pharmacist, District Data Manager
Common goal / objectives	No common goal	Common goal established in initial training for whole district team	Determined by each QI team based on number of CHWs with a similar problem and root cause analysis; usually one objective per quarter and then move on to a new one
Performance Monitoring	No formal performance monitoring in place	Monitor indicators and progress towards targets that were determined during initial training	Data from CHWs collected each month and used to track progress against performance objective
Data use for performance monitoring	No formal procedures for using data	Use cStock data either through printed reports or resupply worksheet data	Supervision data on supply chain indicators collected each month by Senior CHW visits to CHWs
Problem Solving	Participants taught to use a why-why tree to determine root cause, but not well implemented	Participants used preset performance targets and indicators to identify the gaps and then set targets for the following month	Participants given tools to rank problems (based on number of CHWs with similar problems), why-why root cause analysis, and set SMART objectives
Action planning	Participants taught to track actions through a tracking sheet, however not well used and often document only in meeting minutes	Management diaries track actions from meeting to meeting	Tools for creating action plans to achieve the SMART objective and track progress from month to month
Recognition	Recognition included, but may not have been specific to supply chain	QI teams created a recognition plan	Recognition of good performance during each meeting
District engagement	Orientation of woreda (district) and zonal staff	District pharmacist and program coordinators trained as part of intervention; orientation of district management team to provide additional support	Training for district staff on QI team approaches and expected role as coaches to establish QI teams, set meeting schedules, and participate at least once per quarter

## REINFORCING CORRECT AND CONTINUOUS USE OF RESUPPLY PROCEDURES

The project found that the QI teams were essential to **reinforce the correct and continuous use of RSPs and the associated roles and responsibilities to all those involved**. The mutual awareness of assigned roles and responsibilities built through the QI teams was critical to ensuring the maintenance of clarity, and shared accountability that was established based on those assigned roles. SC4CCM found, at both endline and midline, that it was important to ensure that everyone knows the expected supply chain process; that even if the RSP was not always followed, knowing the expected process and the roles and responsibilities for themselves and their colleagues motivated team members to care about supply chain issues and reduced existing tensions around product supply.

"The HC head/director talks about the work of the HC staff and [CHWs] during the meetings. He also talks about how medicines should be stored, how we need to submit reports on time, that we need to fill bin cards daily and that we will receive medicine from the HC depending how we fill out the bin card."

– CHW, Ethiopia

EFFECTIVELY SUPPORTING RESUPPLY PROCEDURES WITH A QUALITY IMPROVEMENT APPROACH: ELEMENTS AND OUTCOMES

Customer Oriented Quality Improvement Approach

Supply chain data visibility

Common goal

Performance monitoring

Multi level team meetings

Problem solving

Resupply procedures

District engagement

Action Planning

Recognition
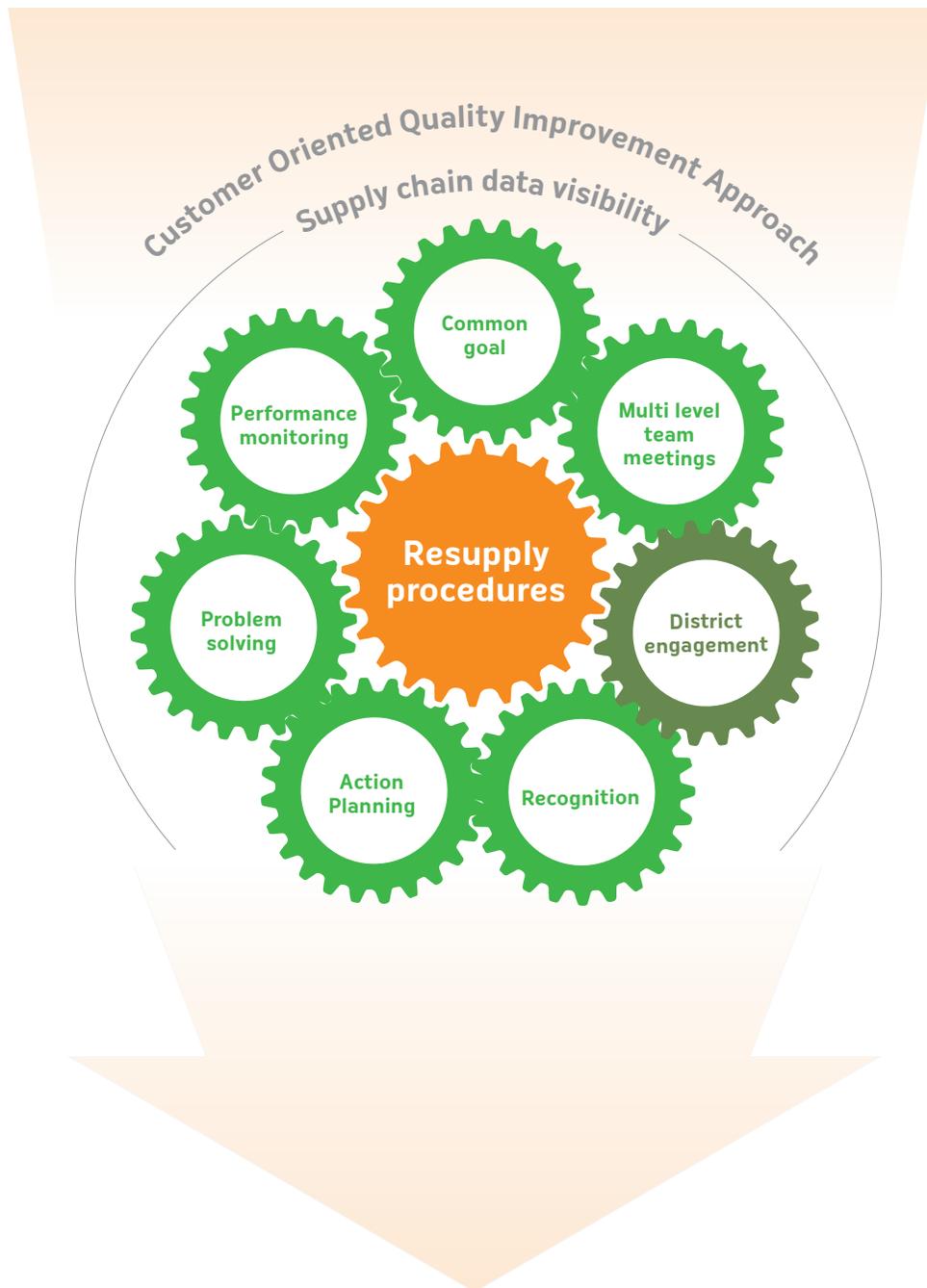
Correct, continuous use of resupply procedures

Transparency, accountability

Shared responsibility, trust, collaboration

Health worker motivation

Solution oriented, empowered teams

"With the RSP introduction in district, we now have good collaboration with HC staff, especially the Pharmacy Manager, when we need products. Today our interactions with her are really good; we approach her and ask products with confidence. I can say it generally helped much in improving our relationship with HC staff because we cannot now feel fear to ask any question we need to ask, because we used to be in the same QI [team] meeting."

— Senior CHW, Rwanda

"We have team work at the HCs. There's a good relationship between the in-charges and the supervisors, so the supply chain issues are not compromised. Also, the District Pharmacist now appreciates the issues of supplying the community. Before, it was business as usual. With [QI team meetings], everyone appreciates the supply chain issues. [CHWs] are fully supported now; before, people were pointing fingers at them."

— District IMCI Coordinator, Malawi

DATA FOR MONITORING, PROBLEM SOLVING AND ACTION PLANNING

The QI approach to **using data for problem-solving was effective in building team-based accountability for community-level supply chain and resulted in better performance of CHWs in following the procedures as per the RSPs**. In all three countries, the QI teams used monthly meetings to identify common problems in implementing the RSPs, identify solutions as a team, and develop an action plan that was revisited at the next meeting. The meetings provided an opportunity for peer to peer learning, as other members of the team supported those who were not as competent in using the resupply tools. The meetings were also used to encourage staff to follow the procedures and recognize high-performing CHWs which in turn motivated others to follow the RSPs. In Malawi and Rwanda, the QI teams also relied on a clear, prescribed source of data for monitoring community level supply chain performance, including the use of the RSPs.

"cStock has motivated me. Before, the [CHW] Supervisor and In-Charge would just call to ask about drugs. Now, cStock gives us a clear view of what is happening, and addressed the challenges that we have. It helps us know what to supervise and the targets we should meet because of the [QI team] meetings that we have. Due to this, our performance has increased."

— HC In-Charge, Malawi

"We realize that these QI [team] meetings contribute to improve our collaboration with HC staff, and through this, we improve performance of CHW indicators, as long as all problems we identified are discussed during these meetings, and solutions are decided together. If we are not able to solve some problems identified, we ask HC staff to forward them to the upper level (district or MOH)."

— Senior CHW, Rwanda

THE IMPORTANCE OF DISTRICT ENGAGEMENT IN INITIATING AND SUSTAINING QI TEAMS

A key finding related to the QI approach is around the importance of district involvement in sustaining QI team related improvements and benefits. In both Malawi and Rwanda, the project played a big role in the pilot period in ensuring district staff were consistently participating in the QI team meetings and engaged in the process. However, results from the post midline period showed that the QI teams were only consistently sustained in pilot districts or effectively initiated in new districts when district QI team leaders took on the responsibility to do so. In both countries, district QI team leaders in many of the new districts were not yet engaged, so QI teams did not show evidence of being scaled effectively, nor were they consistently sustained in several of the original pilot districts.

"My colleagues at the district and I are working together to restart the meetings and strengthen the process…"

"Why do you think the meetings stopped?"

"My personal opinion is that the HC staff needed us. I know that if we, the district, apply some force, the meetings will start again. I don't know exactly why the meetings stopped. But I can say that the district had decelerated its efforts."

— District Pharmacy Manager, Rwanda

"If there weren't HPAT meetings taking place, what actions would you take?"

"Supervision is needed. If the cluster supervisor [district level] attended the [QI team meeting] it would be better. If the issues were forwarded to the district in time, then that would motive them to have meetings. We thought that the cluster supervisors could help us with this."

— District IMCI Coordinator, Malawi

RECOMMENDATION:

Create multi-level QI teams to reinforce the correct and consistent use of RSPs, monitor supply chain performance and take action to address supply chain problems and bottlenecks, ensuring a sufficient level of district leadership and engagement.

3. **Visibility of appropriate and timely community logistics data at both HC and district levels is a prerequisite for managers and QI teams to regularly monitor the supply chain and respond in a timely and targeted way. Implementing an SMS and web-based mHealth system, where data are transformed into relevant, usable reports, can significantly improve timely, accurate availability and usability of community health logistics data at all levels of the supply chain.**
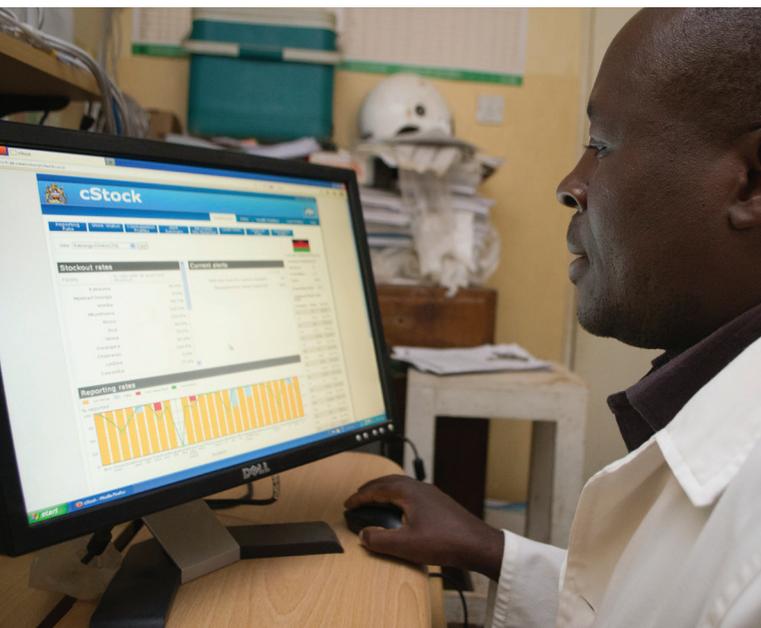
SC4CCM found that improved visibility of quality, appropriate and timely logistics data is achieved when RSPs are reinforced by a QI approach, but having visible and usable data **at all levels of the system** is an important prerequisite for supply chain managers to regularly undertake supply chain monitoring and provide management and supervision in a targeted and responsive way, informed by evidence. Results showed that making data visible through manual-based RSPs facilitates good practices in how products are resupplied, but did not always improve visibility at higher levels. An mHealth system designed to support the community level reporting and resupply process did improve visibility of data to managers at all levels of the system; when data were transformed

into easy to use, relevant reports available on a web-based dashboard and complemented by the QI teams, managers at all levels were further encouraged to more regularly use the data to monitor and make management decisions.

IMPROVED BIN/STOCK CARD AVAILABILITY AND USE: THE FOUNDATION FOR QUALITY DATA IN THE SUPPLY CHAIN

Good record keeping is the foundation of an effective supply chain, as the data reported from bin cards or physical stock counts are the basis for reported data and all data-based decisions made further up the supply chain. Therefore, availability, use, and accuracy of bin cards as indicators of supply chain performance are critical measures of correct and consistent supply chain practices and provide a measure of how well the supply chain is functioning. The effect of the QI team approach on reinforcing correct and continuous use of bin cards as measured by availability of bin cards and bin card accuracy, or consistent and accurate conduct of physical inventory, was seen in all three countries. Ethiopia survey data analyzed by region showed that there was a significant increase in availability of bin cards for all products except zinc. Bin card accuracy also increased from baseline to endline in Ethiopia for all products.

Availability of stock cards in Rwanda was significantly higher at midline than baseline and increased or stayed the same for products between midline and endline in the three districts where QI teams were intensely implemented. Stock card accuracy also increased for all products from baseline to midline, and then dropped slightly when revisited for endline after a period of less consistency with QI team work, but remained significantly above baseline levels, suggesting sustained positive effects of the team work (see Tables 2-5).

Table 2: Stock Card Availability – Rwanda Intervention Districts

Of CHWs who manage each product, % with stock card available on DOV:				
	BL% (n=)	ML% (n=)	EL% (n=)	% diff BL-EL
Amoxicillin	76 (84)	98 (104)	98 (95)*	29
ORS	70 (80)	93 (105)	94 (95)*	34
Zinc	76 (84)	98 (105)	100 (95)*	32
ACT 1x6	69 (71)	90 (103)	95 (95)*	38
ACT 2x6	70 (77)	83 (100)	93 (94)*	33

*Comparison of BL to EL measures, $p < 0.05$

Table 3: Bin Card Availability – Ethiopia Intervention Woredas

Of CHWs who manage each product, % with bin card available on DOV*:			
	BL% (n=)	EL% (n=)	% diff BL-EL
Cotrimoxazole	47 (149)	84 (170)	79
ORS	41 (171)	80 (172)	95
Zinc	62 (78)	75 (150)	21
ACT 1x6	25 (118)	62 (101)	148
ACT 2x6	30 (103)	70 (109)	133

*Ethiopia data are census; no tests of significance were performed

Table 4: Stock Card Accuracy - Rwanda Intervention Districts

Of CHWs with a balance on their stock card, % with stock card accuracy:				
	BL% (n=)	ML% (n=)	EL% (n=)	% diff BL-EL
Amoxicillin	51 (84)	83 (96)	81 (79)*	59
ORS	44 (80)	84 (89)	82 (73)*	86
Zinc	49 (84)	84 (94)	77 (77)*	57
ACT 1x6	8 (71)	91 (77)	82 (62)*	925
ACT 2x6	48 (77)	92 (63)	91 (53)*	90

*Comparison of BL to EL measures, p<0.05

Table 5: Bin Card Accuracy - Ethiopia Intervention Woredas

Of CHWs with a balance on their bin card, % with bin card discrepancy of less than 20%*:			
	BL% (n=)	EL% (n=)	% diff BL-EL
Cotrimoxazole	61 (70)	70 (128)	15
ORS	48 (69)	61 (124)	27
Zinc	65 (48)	79 (89)	22
ACT 1x6	57 (23)	73 (44)	28
ACT 2x6	39 (28)	61 (59)	56

*Ethiopia data are census; no tests of significance were performed

In Malawi, CHWs do not use bin cards but conduct physical counts at the time of reporting data. Using mean CHW reporting rates as a proxy, CHWs in Malawi in districts where QI teams were implemented showed significantly higher reporting rates when compared to the non-intervention group (no QI teams) over the year following the midline, averaging 97% for the group with QI teams and

84% for the group without.[2] This notably higher performance by the QI teams group demonstrates how a QI team approach can further enhance data quality and supply chain practices among CHWs.

Figure 1: Malawi Mean Reporting Rate to cStock by CHWs, on All Commodities in Team Intervention Districts (n=393 CHWs) and Other Districts (n ranges from 253-2705 CHWs Over This Period, as New Districts Were Added to cStock), ML to EL (Jul 2013 – Jun 2014)
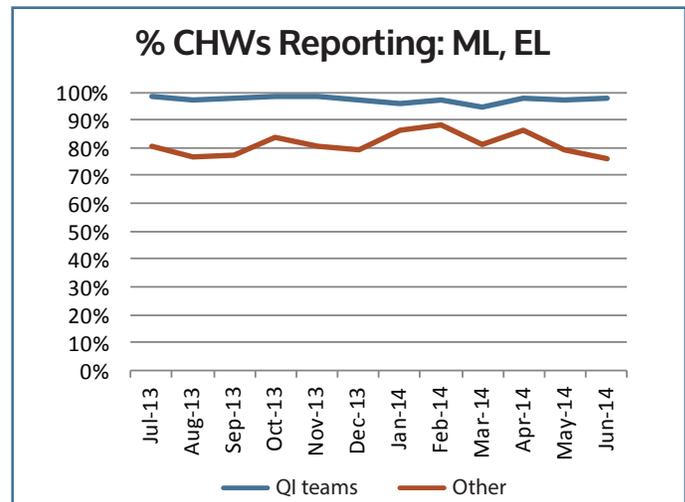
IMPROVED SUPPLY CHAIN DATA AVAILABILITY FOR RESUPPLY

In all three countries, **community supply chain data availability was greatly increased by the combination of RSPs and a QI team approach**, and in the case of Malawi, due to cStock (the mHealth system) data use and visibility at all levels of the supply chain also significantly improved. At baseline, the project found fragmented and inconsistent reporting systems in all three countries. Supply chain data were reported using a variety of forms and to a variety of locations, not all of which were involved in resupply. Data flow was not aligned with product flow, nor was data accurate or complete. For example, at baseline 54% of CHWs surveyed in Rwanda responded that they reported logistics information to the HC, while 57% reported this data to their senior CHW, another 4% reported to the umudugudu (village council), and 2% reported to the secteur (another administrative level). In Malawi, only 43% of CHWs used a form that included all necessary logistics data and only 14% of HCs included CHW data in their reports to higher levels. In contrast, midline survey data showed very high reporting rates using a standard reporting process, regardless of the reporting mode (mobile or paper-based), while endline data showed that these rates were sustained even as project support was withdrawn (see Tables 6 and 7).

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[2] Strengthening community health supply chain performance through an integrated approach: Using mHealth technology and multilevel teams in Malawi, Journal of Global Health, 2014.

Table 6: Reporting Rates, On-time, and Complete Measures for Intervention Groups in Ethiopia and Rwanda

	Ethiopia (Phase 2)*			Rwanda (QC districts)			
	BL % (n)	EL% (n)	% diff BL-EL	BL% (n)	ML% (n) (n=)	EL% (n)	% diff BL-EL
Reporting rate	% CHWs with HPMRR, observed			% CHWs reporting to CC	% Senior CHWs with RSW available last month, observed		
	62 (177)	85 (173)	37	62 (85)	73 (70)	77 (64)	24
On Time	% CHWs with HPMRR submitted by 5th of the month, observed				% HCPM reporting Senior CHWs send RSW on time		
	61 (110)	90 (148)	50	NA	81 (31)**	87 (30)**	NA
Complete	% CHWs with HPMRR observed with all columns completed				% Senior CHWs with entries for all binomes in their cell on the latest RSW		
	79 (85)	87 (148)	12	NA	90 (51)	78 (49)	NA

*Ethiopia data are census, therefore no tests of significance were performed
**Reported data, not observed

Table 7: Reporting, On-time, and Complete Reporting Rates for QI Intervention Group in Malawi

Average rates for Jan-Jun 2012 (BL), Jan-Jun 2013 (ML), and Jan-Jun 2014 (EL) periods; % difference BL-EL				
	BL% (n) Jan-Jun 2012	ML% (n) Jan-Jun 2013	EL% (n) Jan-Jun 2014	% diff BL-EL
Reporting	% CHWs reporting to cStock			
	85 (392)	99 (392)	97 (392)*	14
On Time	% CHWs reporting to cStock on time			
	74 (392)	96 (392)	93 (392)*	20
Complete	% CHWs reporting to cStock on all products managed			
	82 (392)	92 (392)	92 (392)*	12

*p ≤ 0.01

Supply and demand information was part of the resupply request, which was visible up to the HC level in all contexts. When it was visible to the district and national level, as was the case in Malawi, and some of the time in Rwanda, the information sharing was facilitated by the mobile platform or through the QI team meetings.

"When I want to have data or back up for the DTC (Drugs Therapeutic Committee) I can get it from the dashboard. I now have data to present at the meeting. The only problem now is that the district doesn't have budget, but I can use the dashboard data to show what is needed."

—District staff, Malawi

"I didn't really know what the fundamental need for each [CHW] was, what quantity was needed for each CHW. In this disorder, medicines could expire and it would be very difficult to know. Even the management of the stock was difficult. Even in the management of information to make requisitions, we could not easily find that information. With the new RSP, even from the village level up to the health center if you need information it's very easy, there are worksheets, and the documentation is well defined and that new process in general has helped us to avoid stock outs. The stock outs in the past, since we started the RSP, were caused at the national level. It's difficult now to find a stock out at the community level that is due to no information or no follow up."

—HC staff, Rwanda

"What change have you seen since their training on IPLS?"

"Oh, there's a huge difference. Before, they knew nothing about products. A lot of products expired. They didn't know what products they were stocked out on. They acquired all their products as emergency. They'd just come and say, 'I have no more of this; give it to me now.' But now, they know what products they're low on, what they need to have resupplied. They bring their reports once a month and we resupply them. Before, they wouldn't know until they got stocked out."

–HC staff, Ethiopia

TRANSFORMING DATA TO FACILITATE DECISION MAKING, PERFORMANCE MONITORING

Although improved data visibility was achieved in all settings, transforming this data into supply chain performance indicators that are tailored to be useful to different levels of supply chain and program managers was critical for enabling routine use of the data. Simply making the data available and visible is not enough – the project also needed to create a "data culture" and on-going demand for this data – but to do this data needed to be in an easily usable format. Based on project support of the pilot interventions in the various settings it was clear **that effort is better spent in transforming a minimum amount of data into easy-to-understand visuals and reports to facilitate regular and widespread use, than in collecting more comprehensive data that could not be easily analyzed or transformed into useful reports, and making it available to all higher levels.** In Malawi, as seen in Table 8, the mHealth system was able to generate more than ten indicators from two pieces of data which were presented in easy to use reports for the QI teams to monitor performance without additional data sources. In Rwanda, more comprehensive data was gathered through supervision by senior CHWs and used by QI teams to monitor the supply chain performance. Although RSP data was useful for resupply, it was not as easy for HC staff to analyze and transform for the purpose of tracking indicators, nor did RSP data include information on all aspects of supply chain that the QI teams wanted to monitor, such as quality of storage and bin cards. However, given that the supervision data used for performance monitoring required additional effort to collect, analyze, and use, endline results showed that it was difficult to sustain as a data source as QI teams were scaled up nationally. Further, there was no mechanism for that data to be available at higher levels of the health system for follow up with districts and monitoring and identification of QI teams that might need greater support.

Table 8: Key Performance Indicators Available on cStock Dashboard

Reporting Profile
% CHWs reporting
% CHWs reporting on time
% CHWs with complete reporting
Stock Status (by product for CHW, HC, district, national)
Average monthly consumption
Months of stock on hand
Stock status by product, product category
Lead Time (average per HC, district, national)
Total lead time
Time between order-order ready
Time between order ready-receipts
Resupply Quantities Required (product, HC, district, national)
Quantities required to resupply all HCs so they can resupply CHWs
Emergency Orders
Average % of CHWs with emergency orders by product and by month
Order Fill Rates (product, product category for HC, district, national)
% orders filled correctly
Consumption Profiles (by product for HC, district, national)
Total calculated consumption
Total consumption adjusted for stockouts
Total consumption adjusted for stockouts and data coverage

Regardless of how the data were presented, once the right data were available in a usable format, it was the QI teams and meetings that were essential for turning data into supply chain management actions and helping to connect the lowest level to higher levels in the system. As seen with the mHealth system in Malawi, when data are visible at higher levels of the system, this enables staff at those levels to be part of the extended QI team. In Malawi, the visibility of usable data at district and central level, plus the QI approach and mechanisms for routine review, made it easy for managers to monitor the system and better assess the needs of the lower levels. Data visibility facilitated connections between staff from the different levels of the system.

"With the dashboard, we can look on there to see what's going well and what's not, and we can contact people…we can call someone and say, 'I've noted from the dashboard that you haven't done 1, 2, 3, 4, do you need any support?' Or if they're doing well, we can also recognize them… What I saw in the [national level QI team] and [district QI team] is that it [the dashboard] makes us know what is going on, like the stock levels nationally. It just needs someone to have an interest in it, because programs need to look on cStock, and to do that, they have to have the interest. And when there are challenges at the different levels, at the national level, at the district or in the village clinics, each level has a role to play. When there is a problem or an accomplishment, everyone appreciates it."

– Central MOH, Malawi

In Malawi, where the mHealth system was implemented, non-intervention districts that adopted cStock as part of scale up efforts averaged an impressive 84% CHW reporting rate during the endline period (2013-2014), compared with the original intervention districts group's sustained high average performance of 97%, showing the success of scale up for this system, as well as the extent of data visibility available through the system in Malawi.

RECOMMENDATION:

Make community logistics data visible to all levels, and ensure it is transformed into easy to interpret, relevant and actionable reports for each level, to allow for regular use by managers and QI teams to monitor the supply chain performance and respond to supply chain and product availability issues in a timely and targeted manner.

4. **Multi-level QI teams show promise in removing supply chain obstacles and creating a customer-oriented approach focused on the community level, but require significant start-up effort and on-going support and cannot be effective in the long term until other contextual barriers in the health system which prevent teams from working well are addressed.**

In all three countries, the QI teams brought people together from different levels of the system around a common goal. These QI teams set goals and developed action plans, monitored performance over time, recognized achievements and fostered a culture of shared responsibility and problem solving. In all cases where QI teams were well established and supported, the results showed improved trust, collaboration, and communication between staff at the same and different levels in the system. When teams with these characteristics existed, and district engagement and leadership was high, team members, especially CHWs and HC staff, were empowered to meet regularly, demand products, question when there were challenges and participate in finding solutions. When teams used quality, visible data as the fuel for this process, a customer-oriented, continuous improvement culture to supply chain management began to emerge. However, not all QI teams experienced these benefits or changes in culture and mindset. Contextual barriers, such as competing staff priorities, chronic under-staffing, low support for supervision, and long distances to meetings prevented the effective establishment of many QI teams, especially in new districts, but affected original pilot districts as well.

FOSTERING A COLLABORATIVE, RESPONSIVE SUPPLY CHAIN AND CULTURE OF CONTINUOUS IMPROVEMENT

The project found that in all three countries, to varying degrees, **the QI team served as the foundation for the continuous improvement culture that is needed for a responsive, customer-oriented supply chain**. Supply chain problem-solving actions typically require inputs and responses from multiple levels in the supply chain, and in each implementation context, the QI component was responsible for cultivating a team-based approach to supply chain management, and for building the relationships that enabled and facilitated collaboration and coordination. Data visibility and guidelines for use of the data, in combination with the clear roles and responsibilities, contributed to increased transparency and accountability among participants in the intervention in each country. The QI teams were essential for **fostering trust and collaboration**

and moving team members away from a culture of placing blame in the face of challenges. At lower levels, trust and collaboration were improved as CHWs and HC staff were in more frequent contact, had a clearer understanding about each other's roles, shared a common purpose, and were able to draw on tools and techniques that were solution-oriented when supply issues emerged; in the endline case study, health workers identified and discussed the benefits of this improved relationship.

"What have been the effects of QI team meetings?"

"There has been a big impact because of vertical and horizontal coordination of different cadres and receiving help with having problems from coordinators so we come to solution with suggestions from the [CHW] Supervisor, in-charge, and myself. So the problem can be preceded with all of us. Before [QI team] meetings, the district is the one that tells us what to do and I couldn't buy into it. But it is better because we all sit and discuss things together."

– HC Cluster Supervisor, Malawi

"The QI [team] meeting is good for us; we interact with HC staff and feel valued compared to before. We no longer feel they are our bosses, and they inform us early so we can attend. And they don't stress us when we have not done well."

– Senior CHW, Rwanda

The case study approach at endline allowed us to understand that the range of benefits were easily identified by all respondents, and that they were identified in response to a variety of questions on RSPs, the QI team meetings, and on product availability, demonstrating that **benefits of the QI components of the SC4CCM interventions were rapid, transformative, far-reaching and pervasive**. The QI component was identified by endline and midline evaluation participants as contributing to team-building, collective problem-solving, and improved relationships, identified by all levels and in both original and scale-up districts, as well as at the central level, in all three countries. These benefits increased team member motivation and commitment to continually improve their supply chain performance and engendered a sense of pride in their individual and team contributions to the work. The multiple benefits to coordination, communication, and collaboration derived from the QI components of the SC4CCM interventions cannot be over-stated.

SUPPORT FOR OVERCOMING CONTEXTUAL BARRIERS

SC4CCM's results showed however that these teams cannot achieve – or sustain—their mandate or these benefits without regular support to ensure that contextual barriers could be overcome. This was especially important in the QI team startup phase; we found that teams that had intensive support, reinforcement and time to get well established were able to sustain QI practices and principles in the longer term even after support had ended. After initial creation, **QI teams require support** to ensure they develop the routine of meeting regularly, using data and developing a focused agenda to address supply chain performance and product availability issues, sharing problems and finding solutions together, and recognizing improved team and individual performance. The project also found that teams did not have the experience of setting agendas and running meetings; building this capacity by providing tools and guidelines proved to be an important part of the intervention in both Malawi and Rwanda.

Contextual issues form a big part of the challenges to QI teams meeting regularly. CHWs often needed to travel long distances by foot and in inclement weather, their workloads required them to consider how to prioritize meetings, and other duties often interfered. In many cases, financial and other incentives to meet were not available, explicitly by design so as to facilitate sustainability. However, this proved to be especially problematic when CHWs were volunteers, as was the case in Rwanda, and had to collect supervision data prior to attending meetings (as per the QI team model in Rwanda) since meetings were perceived to be even more burdensome.

"Do you have meetings just for the health posts and HCs?"

"No we don't anymore, it stopped a while ago. It used to be every Friday 3-4 months ago. We all attend the meeting with the kebele [village] now, which includes HC staff. The HC wanted us to continue the meetings, but we said no because it was hard for us to have meetings with them every Friday and to also have kebele meetings on Saturdays. Also the meetings were in the afternoon, which was a bit difficult for us"

– CHW, Ethiopia

"So you have spoken about the importance of the QI team meetings and their relaunch, in light of this new training next week, do you think you will participate in the QI team meetings in the future?"

"Another problem is that we don't participate in everything, but we participate in some things. Sometimes, like I can't go to the May meeting, another meeting was called that I have to go to, so I call my deputy and see if he is available, so we try to participate as much as possible."

– District CHW Supervisor, Rwanda

'What were the challenges of having these meetings?"

"People were not attending; people wanted allowances to attend the meetings. Even for [QI team meeting], other [CHWs] find distance a problem; they want allowances; they do not have roadworthy pushbikes so they could not come when asked to."

– District staff, Malawi

In all three countries, to handle these challenges, once QI teams were established, the project and MOH and district partners supported QI team work by providing intensive supervision and reinforcement over the 9-12 month pilot period, which was sufficient for the teams to become well established. In Rwanda, the QI teams received support from the project during the test period, and after an initial period of intensive reinforcement and follow up, were able to continue without significant support. However, in the scale up districts, the endline evaluation showed that **without that initial period of intensive support and supervision, meetings were not happening regularly and when they did, they did not always use data, adhere to the QI practices, or focus on problems they could address**. In Malawi similar results were found during the endline case study, in that the districts that received intensive support during the test phase continued to be high performers after

midline without the support, whereas the scale up districts did not receive intensive support and uptake was slower and varied.

> **RECOMMENDATION:**
>
> Empower the QI teams to be solution-oriented; create a culture of shared responsibility and continuous improvement, so that teams demand products, question when there are challenges, and participate in finding solutions. Invest in intensive support, reinforcement, and time (ideally 9-12 months) to firmly establish QI teams in the first intensive wave, continue with less intensive support after teams have become institutionalized.

5. **Because the community is located at the last mile of the supply chain, despite successful, focused intervention implementation at lower levels, and achievement of intermediate supply chain outcomes, sustained progress towards improving product availability of health commodities at community level is not possible without dependable national level availability and a supply chain that facilitates efficient movement of community products to resupply levels and data to and from all levels of the system.**

During project inception, the assumption was that bottlenecks between the HC and CHW were primarily responsible for challenges in product availability among CHWs. The SC4CCM experience demonstrates, however, even when those bottlenecks are addressed, product availability can remain a challenge. **The interventions tested by SC4CCM strengthened supply chain management processes at the community level, but were not able to affect product availability or ineffective supply chain practices at the higher levels of the supply chain**.

SC4CCM's findings confirmed that, as with all other levels of the supply chain, product availability at the community level is influenced by numerous factors. Key prerequisites for community level product availability include having enough products at the national level to supply all programs and levels, and ensuring that product flow and data flow are aligned and functional for all levels of the supply chain – not just the community level – so that products for the CHWs flow down to the HC in sufficient quantities, informed by CHW logistics data that flows up to all levels for timely decision making. The importance of using regular quantification, informed by CHW needs, for procurement

and supply planning is a recognized strategy routinely used for ensuring product availability at higher levels of the supply chain; our experience confirmed that a sufficient supply of products at the national level to accommodate the needs of all programs and levels is equally important for the community level. To support this, quantification and supply planning must happen routinely to ensure CHW needs are accounted for during national procurement exercises- if products are not available in full supply for all levels where they are used, CHWs are likely the first to feel the effects of the shortages without deliberate intervention. Furthermore, the supply chain must use data on community level needs to routinely deliver appropriate amounts of products to the HC. This means the flow of products and data must be aligned at all levels of the system to ensure products do not get stuck at any one level before reaching the HC.

We were able to pinpoint national product availability and overall supply chain functionality as two key hindrances. This proved to be a barrier in all three countries to achieving or sustaining measurable improvements in community level product availability. SC4CCM did not have the mandate or resources to tackle these higher-level supply chain management practices which were found to be preconditions for improved product availability at the community level. While we strengthened resupply and data use processes and skills at the community level, and supported routine, data-based quantifications in all countries, the project was not able to influence financing or country procurement practices, which ultimately determine how much product is available at the national level. Nor were we able to take a "whole" supply chain approach to ensure that resupply practices from community to central levels were aligned optimally. In Malawi, national product availability is a chronic challenge due to the economic crisis the country is experiencing; in Rwanda, while the national product supply appears to be sufficient, bottlenecks in product and information flow alignment between the central and HC levels were responsible for product availability challenges at HCs and therefore among CHWs.

EVIDENCE THAT COMMUNITY LEVEL SUPPLY CHAIN CONSTRAINTS WERE REMOVED

Our findings show that when quantities were in sufficient supply at resupply facilities, HCs would fill CHW orders per the RSPs, but as would be expected, they could not when the facilities were also stocked out or under-stocked. For example, in Figure 2 below, data from Rwanda show that the ability of HCs to fill orders (order fill rate, OFR) was closely related to their own stock status of each product.

Figure 2: Rwanda, HC Stock Status in 3 QI Teams Districts for the Last Month, by Product (EL 2014) Compared to Senior CHW OFR in 3 QI Teams Districts by Product.
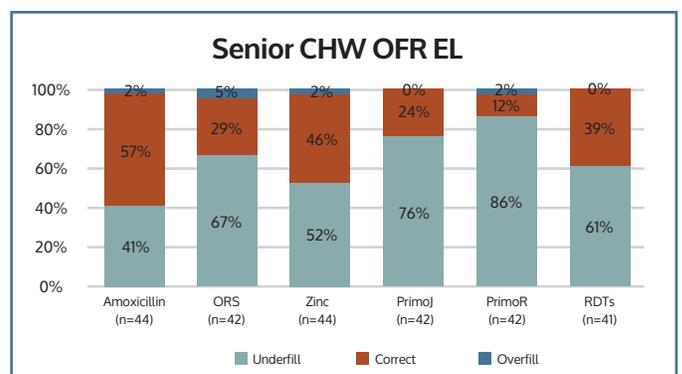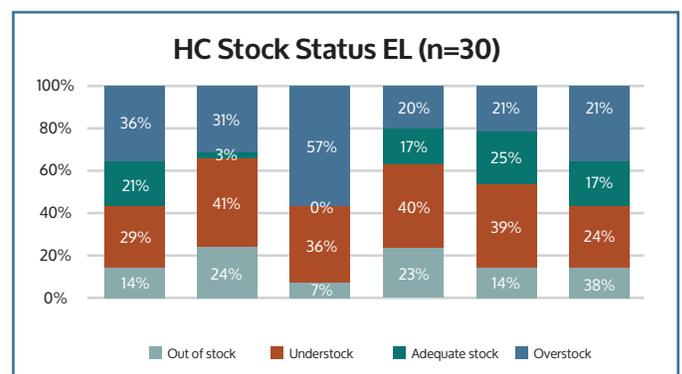
We found in comparing results across districts that establishing supply chain practices at the community level, and implementing supportive QI teams, created a more responsive and customer-oriented supply chain, which sometimes mitigated the effect of product shortages at national level. While we saw that product shortages can be a disincentive for correct and consistent use of RSPs in some cases, our evidence also shows that a QI team can play a critical role in unlocking bottlenecks that prevent the continuous flow of products at district and HC levels, by improving communication and collaboration and introducing the shared objective of customer service that prioritizes product availability.

At the district level in Malawi, we saw that districts with QI teams had a more reliable supply chain with fewer stock outs, despite the chronic national shortages experienced country wide. cStock data provides a view of month by month availability trends for all products to compare the CHWs that participated in QI teams to the CHWs without QI teams. While product availability improved over time for both groups and then decreased slightly, the group with QI teams was higher all along. This indicates that amidst the known fluctuations in national product availability, the QI team group was able to better manage these and mitigate the effects.

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

–Central level, Malawi

"For example, maybe if the [health center] is stocked out, during the [QI team] meeting, we still discuss about the stockout and find solutions for managing the stockout. So the [QI team] meeting contributes to finding the solution"

– HC staff, Malawi

"…I participated in the QI [team] of February and March 2014. QI [teams] are good; we discuss on problems identified during our supervision visits in villages and we found solutions. We used to meet once in a quarter, but we have been told it will now be once in a month. During the last QI [team] meeting we had the problem of stock out of both Primo Jaune and Primo Rouge [ACT 1x6] and Primo Jaune [ACT 2x6] which was last from November 2013, but now the HC did advocacy and now we have received few quantities to use. Also, the QI [team] helps us to plan our activities and decide activities to be done in solving identified problems."

– Senior CHW, Rwanda

Figure 3: Malawi, Average In-Stock Rates Across 5 iCCM Products, QI team and Other Districts from BL (Jan 12) to ML (Jan 13) to EL (June 14)
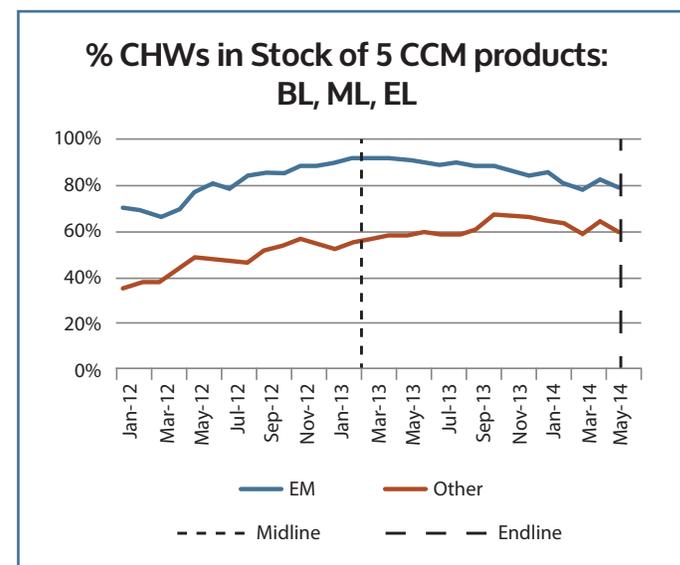

In Rwanda at midline, when the QI teams were functioning well and receiving the level of support per the design, QI teams had significantly better product availability compared to non-intervention districts. At midline, 63% of CHWs in QI team districts had all five products in stock compared to only 38% in districts without QI [teams], and up from 35% of CHWs at baseline. At endline, with less project support, CHW product in-stock rates declined to baseline or lower levels. For five of the six products, in-stock rates at HC at the same two points of measure also decreased, although it is not possible to determine what proportion of the CHW decrease can be attributed to HC product shortages rather than problems higher up in the supply chain and the limited implementation of the QI teams.

Figure 4: Rwanda, % of CHWs in QI Districts with Each Product in Stock on Day of Visit (DOV), Baseline, Midline, and Endline

% CHWs in stock DOV: BL, ML, EL

Baseline   Midline   Endline
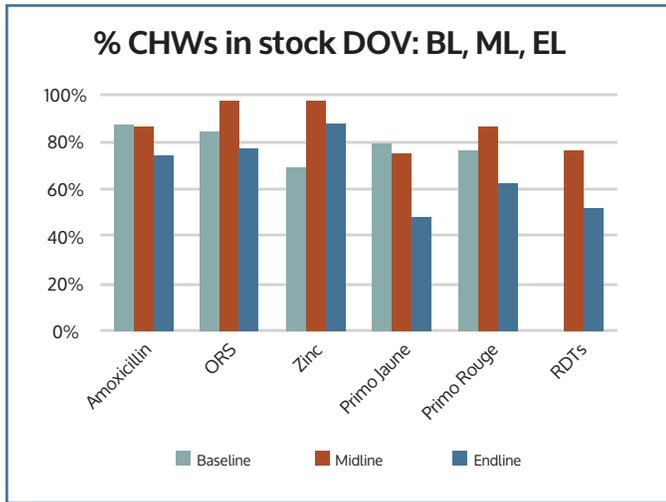
In Ethiopia, product availability increased slightly at endline for most products, declining for zinc as a result of national supply challenges. Endline results suggested that having a largely functional supply chain between CHW and HC levels could not fully compensate for supply imbalances due to insufficient attention to supply chain procedures for iCCM products at higher levels.

Figure 5: Ethiopia, % of CHWs in Amhara and SNNP who manage each product with product in stock on day of visit (DOV), baseline and endline

% CHWs in stock DOV: BL, EL

BL % (n)   EL % (n)
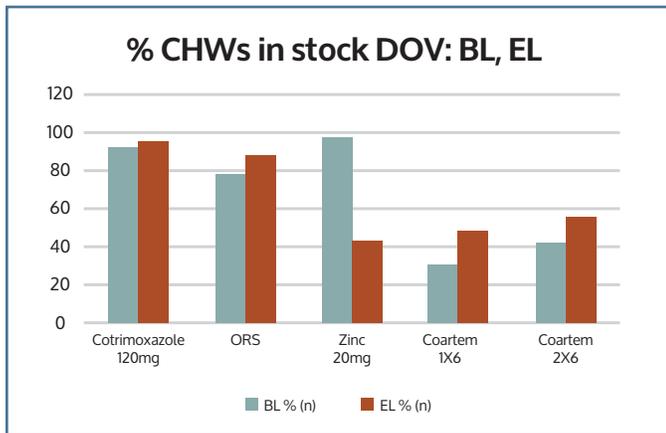
Sustained progress towards improving product availability of health commodities at the community level is not possible without dependable national level availability. The fact that all of the SC4CCM evidence identifies that higher-level supply chain management processes and practices are drivers of community level product availability, regardless of the intervention design and implementation

variability experienced in these three countries, reinforces the importance of policies that prioritize product availability at the community level and the critical requirement that national procurement and supply chain practices at the higher levels need to be improved to achieve the goal of community-level product availability. QI teams and the data from the community level need to also be linked to the national level, which in turn must also prioritize the needs of the community and ensure adequate supplies are flowing through the system.

RECOMMENDATION:

Align product flow with data flow and use the information to ensure there are adequate products at all levels to fill the entire supply chain. Recognized strategies and supply chain practices such as routine quantification using CHW logistics data and supply planning to inform procurement have been adapted to accommodate CHW needs and should be implemented.

SCALE AND SUSTAINABILITY

It is important to recognize the difference between findings from the first phase of the project, and the last. In the first phase, the project's intent was to measure the effectiveness of the supply chain intervention. Thus, success was measured by looking at product availability and other key supply chain outcomes to understand whether and which intervention showed the most promise for improving overall supply reliability for community products. In contrast, having demonstrated effectiveness, during the second phase of the project, the focus turned to assessing scale, sustainability and institutionalization, and newer lessons emerged. Interventions that worked well with consistent project implementation support and won the backing of MOHs for further scale up, were observed once the original supports were removed and country governments took the leadership role, often supported by other implementing partners. This second phase attempted to better understand the extent to which thinking about scale and sustainability at early design stages of the project was successful, and if so, what aspects could become transferrable to other countries or programs trying to strengthen community supply chains. Lessons emerged in terms of how different intervention elements survived in the context of the existing health system.

Many challenges exist in health systems, particularly in resource constrained environments, including: staff turnover, shortages in human resources for health, low resources for supervision, capacity, and limited resources for the provision of necessary products, equipment and infrastructure. In all three countries, all of these challenges affected the ability of these interventions to achieve scale and become institutionalized. In some cases, barriers were strong enough that, despite user preferences for the intervention, the intervention was not able to continue, and in other cases, implementation was a pared-down version of the tested intervention, largely due to insufficient support during the start-up phase.

In terms of the key indicator, product availability at the community level, endline results were varied. In Rwanda, where interventions tested showed the most success in terms of attributing improvements to project efforts at midline, product availability dropped significantly at endline, back to or lower than baseline levels despite relatively consistent use of RSPs. Use of QI teams in Rwanda did not continue with the level of support indicated per the design because of the systems constraints outlined in this report. In Malawi and Ethiopia, product availability declines were not as evident, and in some cases showed improvement, but these results cannot be fully attributed to the interventions themselves and are still heavily dependent on national product availability and the functioning of the rest of the supply chain.

CONCLUSION

The SC4CCM project had the opportunity to work in three countries with successful, but different iCCM programs and a variety of implementation contexts to gain an understanding of the common supply chain constraints CHWs face, and identify simple, affordable solutions to overcome them. Over the course of five years we were able to identify several key, interrelated findings which can be applied to other iCCM settings to inform supply chain improvement for the lowest level of the system. While improvements at this level are not easy, solutions do exist that have great potential to strengthen community health supply chains and can be implemented to yield improvements in child health program effectiveness, coverage, and scale. However, these solutions — namely simple demand-based RSPs for CHWs, supported by multi-level, performance-driven QI teams — must be implemented within the context of a supply chain where data are made visible to all levels and are used for effective resupply at all levels, and the iCCM program is supported by timely national level quantification and procurement.

RECOMMENDATIONS

1. To gain time use efficiencies, increase transparency and accountability for community products, and clarify roles and responsibilities for supply chain management at the community level, simple, streamlined, demand-based RSPs customized to the context should be introduced at the community level

2. Create multi-level QI teams to reinforce the correct and consistent use of RSPs, monitor supply chain performance and take action to address supply chain problems and bottlenecks, ensuring a sufficient level of district leadership and engagement.

3. Make community logistics data visible to all levels, and ensure it is transformed into easy to interpret, relevant and actionable reports for each level, to allow for regular use by managers and QI teams to monitor the supply chain performance and respond to supply chain and product availability issues in a timely and targeted manner

4. Empower the QI teams to be solution-oriented; create a culture of shared responsibility and continuous improvement, so that teams demand products, question when there are challenges, and participate in finding solutions. Invest in intensive support, reinforcement, and time (ideally 9-12 months) to firmly establish QI teams in the first intensive wave, continue with less intensive support after teams have become institutionalized

5. Align product flow with data flow and use the information to ensure there are adequate products at all levels to fill the entire supply chain. Recognized strategies and supply chain practices such as routine quantification using CHW logistics data and supply planning to inform procurement have been adapted to accommodate CHW needs and should be implemented.

METHODOLOGY

The data sources for analyzing the findings in this report included: 1) baseline surveys and learnings regarding feasibility and affordability during pilot; 2) midline evaluation survey and qualitative results, and 3) endline evaluation surveys and case studies. Descriptions of the study designs and data collection techniques for the midline and endline evaluations have been published elsewhere. In short, SC4CCM used a Theory of Change (TOC) as the guiding evaluation framework, conducting baseline and midline assessments in select areas of Rwanda and Malawi in 2010 and 2012–2013, respectively, using complementary quantitative and qualitative methods. In Ethiopia, a baseline was conducted in 2012 using the same methods. The quantitative survey tool, called the Logistics Indicator Assessment Tool (LIAT), was adapted from tools originally developed by the USAID | DELIVER PROJECT, including questionnaires, inventory assessment forms, storage assessment forms, and key informant interview guide. In Rwanda and Malawi, supplemental data sources were also considered, including routine data collected through cStock in Malawi.

In 2014, endline evaluations were conducted in all three countries, including a qualitative case study component supplemented by quantitative measures of product availability. Country-specific analyses of the endline case studies were carried out first, and integrated with quantitative results. Cross-case analysis then used pooled qualitative data coded in atlas.ti and triangulation with case-specific findings, integrating survey and case study data, and included a large team for validation and triangulation purposes. The graphics in this report were developed by the cross-case analysis team based on the results of the integrated, triangulated data analysis.

APPENDIX:

LESSONS LEARNED IN IMPLEMENTATION

Implementation of simple, stream-lined demand based RSPs, supported by QI teams and improved data visibility, is not without its challenges, but we believe that the results of implementing these findings are worth the effort. Our aim is to extract and summarize lessons we learned in implementation that can be useful to other programs striving to improve the supply chains for their community health programs, no matter the specific implementation environment.

IDENTIFY AND EMPOWER CHAMPIONS TO SUPPORT AND DRIVE IMPLEMENTATION.

Cultivating champions at both policy and operational levels laid the foundation for successful implementation during the pilot stage and transition to scale up. At an operational level, in all three countries the project created local level champions who initially served as master trainers for the intervention roll out, and then became invested in monitoring and supporting CHWs in their implementation of the intervention after roll out. District staff, in particular, were critical to the ongoing management and oversight of the interventions. In Malawi, district program and pharmacy staff were trained in training of trainers in the intervention, and more formally formed the district level QI teams which interface with the HC/CHW QI team. Every district has at least one champion who is a member of the QI team and also a master trainer, recognized by the district health management team (DHMT) as the point person for the intervention. In the Malawi case, district champions and the district QI team have access to performance data visible through an electronic dashboard to better target their support. In Rwanda, district coaches were identified as the local champions and in many cases provided the support necessary, but HC CHW supervisors often took up this role as well, ensuring that QI team meetings occurred regularly and the process was followed and the problem solving cycle completed. In Ethiopia, the Primary Health Care Unit Director (HC in charge) and woreda pharmacy staff were included in trainings and orientations so they could serve this function, ensuring that CHWs were trained and supported, that supply issues were routinely raised during monthly meetings, and that procedures were monitored and followed. Also, in all three countries, champions existed at the national level, initially by program managers (IMCI in Malawi, Community Health Desk in Rwanda and FMOH in Ethiopia), and then more broadly among supply chain managers as implementation was successful. These central level champions were consulted from the start of

the project's work in country, remained involved through the process of design and implementation, providing key approvals, support and unlocking bottlenecks at critical moments, and were ultimately instrumental in catalyzing broader MOH and partner buy-in and support for scale up.

SOLIDIFY NATIONAL LEVEL LEADERSHIP FOR IMPLEMENTATION, OVERSIGHT AND ADVOCACY

Beyond requiring champions at the policy and management levels, community health supply chains and implementation of the intervention as a strategy for improving them, also requires strong national leadership to promote local level adoption of the new intervention practices, to secure the on-going financial and technical support needed through government or advocacy with partners, and to provide oversight and direction to keep the new practices going. Leaders are likely to come from the group of champions. Many times the activities of community health fall under the management of a program such as IMCI or community health, while the activities of strengthening supply chain may fall under the purview of a pharmaceutical support unit or logistics management unit. In order to provide the best support to the QI teams and their activities, it is important to establish clear leadership, shared or not, and coordination of inputs at the national level. In Malawi, initial implementation of the intervention was driven through the IMCI program, but later transitioned to the MOH HTSS Pharmacy Department which is now in the leadership role; coordination continues between HTSS and the programs through a technical working group. In Rwanda, the head of Community Health Desk has been the driving force behind the intervention and all community supply chain improvements; once scale up began, coordination has expanded to include the Logistics Management Office and National Malaria Control Program. In Ethiopia, the initial drive was led by the Pharmaceutical Funds and Supplies Agency and later the Child Health Program, with the MOH Logistics Unit, have become important advocates for scale up.

ESTABLISH A CLEAR PROCESS FOR HANDLING STAFF TURN-OVER

Staff turn-over is inevitable in any system and therefore a process needs to be established to train new staff in the intervention as they take up their jobs and instill a sense of responsibility among new staff to continue the intervention. The master trainers developed during the initial roll out of the intervention can serve as a resource for future training. It is important to establish clear responsibility and a clear process for providing on the job training, or workshop style training should numbers warrant, to ensure that the intervention continues to be implemented effectively and

benefits continue to be realized. In Malawi, while it was assumed that the master trainers/district champions would take on this role, it is only now becoming more formalized as the endline evaluation showed inconsistency in the practice of handling staff turnover, and some staff, while they were oriented, have not implemented that knowledge. In Rwanda, the simple nature of the RSPs mean that staff can train each other on how to use them, but further training through MOH training of trainerss and district coaches will be needed to ensure correct and consistent use over time and ensure that the QI teams continue, if QI team leadership is lost, either at the HC or district level. In Ethiopia, IPLS for CHWs was being included in the orientation or replacement training for new staff due to the initiative of many HC Directors; however the current recommendation is that this be included formally as part of scale up.

INTEGRATE SUPPLY CHAIN INNOVATIONS INTO EXISTING LOCAL STRUCTURES AND SYSTEMS

There are pros and cons of adding QI activities to existing meetings as now done in Ethiopia compared to Malawi and Rwanda where they were stand alone meetings. Including QI activities into existing meetings has the benefit of ensuring that these activities are more easily institutionalized; however, in our experience it also resulted in some compromise on the quality of the QI activities implemented. In Ethiopia, the QI activities were added to the agenda of the Primary Health Care Unit meetings that were mandated by the MOH and include HC staff and CHWs. As this meeting was mandated to happen through a policy decree, meetings occurred regularly and the IPLS, through our efforts, became part of agenda for that meeting routinely. However, some QI processes, such as how to conduct and track problem solving /action planning, were not well implemented, as instead RSPs and supply issues was treated like other agenda items and discussed in a less structured way and recorded in the meeting minutes. This was in contrast to Rwanda and Malawi where QI meetings were introduced as stand-alone meetings with specific tools and processes by the project. In Rwanda, the QI team meetings were set up as an additional, stand-alone meeting to ensure that the focus was on the supply chain data, problem solving, and action-oriented planning and feedback cycle. The endline evaluation revealed that many CHWs and HC staff cited this as a burden, but not an actual impediment to the meeting happening. Many said that if the higher level called the meeting, they would go, though it contributed to a heavy workload. They voiced the opinion that incentives for participation in this meeting and traveling to it would be appreciated and make it more palatable as a task in addition to their

many other responsibilities as volunteers. In Malawi, the QI team meetings were also introduced by the project as no other meeting occurred between the CHWs and HC staff, and at the HC, the frequency of the meeting was not reported as a burden, only the length of the meeting if it continued through lunchtime and no refreshments were provided. At the district level, however, the burden of an extra meeting was felt by the district level staff who attend many meetings. Recommendations were made to integrate supply chain QI activities into existing meetings at this level.

This tension between instituting a stand-alone meeting focused on supply chain QI activities and adding QI activities to an existing meeting is not easily resolved. A dedicated QI meeting is the ideal as it ensures a focus on supply chain processes and related problem solving, but may be unrealistic is some settings. The decision on which to do will depend on the context and what is feasible.

We hope that program and supply chain managers will use these findings, recommendations and lessons learned to inform their efforts to improve supply chains at the community level, so children under five will receive the medicines they need when they need them close to home.

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