Increasing access to commodities through cStock, flexible community based reporting and resupply tool

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Acronyms and Abbreviations

ASAL	Arid and Semi Arid Lands
CBD	Community Based Distribution
CHA	Community Health Assistant
CHU	Community Health Units
CHS	Community Health Strategy
CHV	Community Health Volunteer
DE	Development Evaluation
DMPA SC	Depot medroxyprogesterone acetate Subcutaneous
DIS	Dispensed
HCD	Human Centered Design
HFIC	Health Facility In-Charge
IT	Impact Team
ITT	Indicator Tracking Tool
KHIS	Kenya Health Information System
MOH	Ministry of Health
OH	Outcome Harvesting
SOP	Standard Operating Procedure
SOH	Stock on hand
TOT	Trainer of Trainers
USSD	Unstructured supplementary service data
UHC	Universal Health Care

Executive Summary

inSupply adapted cStock in response to supply chain challenges at the community level that led to inadequate availability of life saving commodities in Kenya. cStock is a comprehensive solution that combines mobile technology, user-friendly dashboards, and quality improvement teams (IMPACT Teams), using a combination of manual-based tools.

inSupply **used human centered design (HCD)** to get user perspective on local supply chain barriers, and used this feedback to adapt supply chain models and cStock. This was complemented by **developmental evaluation (DE)** which allowed the team to look at data and iterate on the approach in real-time and make changes as necessary. This approach was particularly important for overcoming challenges in the arid and semi-arid lands (ASAL) region in Kenya. For example, to address low literacy rates among community health volunteers (CHVs), voice and visuals for each commodity were incorporated into cStock to ensure these staff were able to effectively use the tools.

Despite the success, **challenges** remained. The biggest threat to continuous adoption of cStock is the inadequate supply of commodities. Other underlying and pervasive challenges included mobile network availability, logistical challenges related to road conditions, and CHV motivation. Our **recommendations for future implementation:**

- Technology alone will not resolve supply chain challenges, it needs to be paired with engaging people and using data.
- Engaging users in the design of a system (using HCD) ensures that it is applicable and appropriate in various contexts.
- Technology can help but there is a need to address the chronic shortages of commodities.
- Need to integrate supply chain within broader health information system to reduce the burden of CHVs using multiple systems.

Results from cStock implementation

- In 5 counties, **reporting increases from 25% to 60%** (of SOH and DIS receipts) from Oct 20-June 22, even after project support ceased. However, the results were variable in the ASAL region in response to specific challenges (e.g., high staff turnover).
- 98% CHVs find cStock easy to use, and 89% less than an hour reporting to cStock.
- CHAs, sub-county and county officials all see cStock as an important accountability tool.

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BACKGROUND

Evolving cStock to be an inclusive digital and system strengthening approach for community health supply chains across Kenya

Supply challenges at the community level hinder UHC

Community Health Volunteers (CHVs) play a critical role in Kenya's vision for communities to have zero tolerance for preventable childhood deaths. As CHVs are increasingly seen as critical partners for achieving Universal Health Care (UHC), and community services are expanded, strengthening the community supply chain has become critical to the success of these programs.

Common challenges for community supply chains, include:

- ill-defined community supply chain management systems
- limited supply chain data visibility and data use, and;
- low accountability and poor inventory management

These challenges lead to inadequate availability and pervasive stock outs of life saving commodities and pose an important barrier to realizing Kenya's goal of UHC. The situation is even more challenging in the remote and hard to reach Arid and Semi Arid Lands (ASAL) with migratory populations.

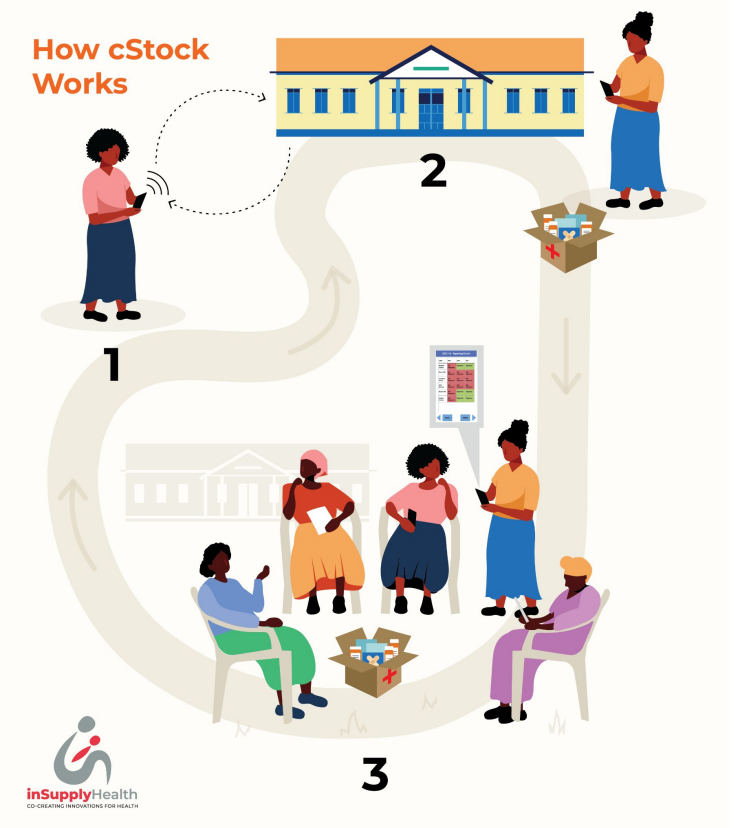
cStock was developed to fill gaps and strengthen community supply chains

inSupply developed cStock to strengthen community supply chains. cStock is a comprehensive solution that combines mobile technology, user-friendly dashboards, and quality improvement teams (IMPACT Teams), using a combination of manual-based tools.

cStock has been customized for reporting and resupplying of health products managed at the community level.

Three key components of cStock

1. **Mobile Technology:** The cStock platform was designed to interact with whatever technology is available to the users
    - **With a smartphone or tablet**, the cStock app can be used like other standard Android applications and collects logistics data.
    - **When connectivity is limited/inconsistent,** cStock works offline and data is submitted when there is internet access.
    - **For users with feature phone or no internet access**, data is sent via Using Unstructured Supplementary Service Data (USSD), at no direct cost to the user.
2. **User-friendly Dashboards:** Data reported by the CHVs and/or the Community Health Assistants (CHAs), are converted into relevant, aggregated, and timely information to measure the performance of the supply chain. **The dashboard:**
    - displays data in easy-to-read graphs and charts that are accessible via a phone or laptop providing the user with a choice of different visuals for the same indicators to help in decision making.
    - are user centered to allow decision making at the community, facility, sub county and county levels.
    - includes key indicators that are monitored on a monthly basis: reporting rates, stock status, stock outs, reporting and processing of emergency orders and consumption rates.
3. **IMPACT Teams:** IMPACT Teams provide a structured approach for using data and create a culture of joint problem solving. The teams were trained to develop, interpret and set targets for key supply chain indicators, use action-oriented dashboards, and follow a structured, problem-solving process using their data.



cStock evolution

2010-2014

cStock originally implemented in Malawi by JSI*. Ownership successfully transitioned to MOH, who partnered to scale cStock to all of its 3000+ community health workers nationwide. cStock further adapted manage vaccines.

2017-2018

To address supply challenges at the community level in Kenya, JSI works with MOH to pilot cStock in 2 sub-counties in Siaya County (Bondo and Ugunja)

Results:

- CHVs found it easy to use and reduced their workload, kept them updated on stock levels and provided accountability that made the facility staff feel more comfortable releasing commodities to them
- 20% increase in CHV reporting rates (62% to 82%); 95% of CHVs report cStock is easy to use; 26% improvement in order fill rates for condoms

2018-2021/22

Based on positive results in Siaya, MOH used the cStock experience to redesign electronic Community Health Information System (eCHIS) Commodity Module to be scaled up across CHVs in all 47 counties

inSupply and MOH customize cStock as a community health supply chain strengthening approach that could be scaled to all 30,000+ CHVs in Kenya. Use HCD to understand and address core supply chain challenges.

Scale cStock in all 6 subcounties in Siaya (Grand Challenges Canada under the Saving Lives at Birth Program support) and in 4 ASAL (Arid and Semi Arid Land) counties of Mandera, Turkana, Samburu and Wajir (BMGF project).

**inSupply Health is affiliated with JSI Research & Training Institute Inc. (JSI), and in collaboration with JSI built on the original cStock implementations , adapting them to the Kenyan context.*

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IMPLEMENTATION APPROACH

How the cStock approach adapted to local challenges in real-time and built ownership and sustainability

HCD used to redesign cStock based on local needs; evaluation methods used for ongoing improvements

Get **user perspective** on local supply chain barriers (including cultural and geographic) in the ASAL countries.

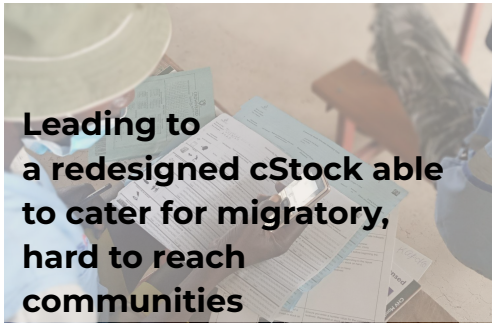
Adapt supply chain model(s) and cStock to respond to user feedback

Complemented by a number of methods to evaluate and revise the approach in real time

Developmental Evaluation: An approach that allows rapid assessment, sensemaking, and adjustments to implementation of an intervention. This allowed us to iterate on cStock implementation in real-time by fostering analysis and use of the vast amount of information emerging

Routine Monitoring: Used throughout the life of the project tracked key performance metrics such as reporting rates and implementation of activities like monthly IMPACT Team meetings.

Outcome harvesting: An evaluation method that entails combing through various documentation to collect positive and negative, intentional and unintentional outcomes. The outcomes are described in detail including supporting evidence then validated by a team of substantiators. The substantiators are made up of personnel from the system or level the intervention intended to impact.



User-driven design updates respond to the local challenges

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Challenge: Low literacy among the CHVs

Redesign: Voice and visuals for each commodity introduced to support access to CHVs with low literacy.

Challenge: Fewer smartphones with the CHVs

Redesign: Use of USSD option that allows for use by CHVs with features phone.

Challenge: Centralized user management

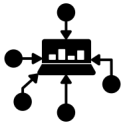
Redesign: Development of a community health assistants (CHA) portal to enable decentralized user management e.g. add and remove users as staffing patterns changed.

Challenge: Performance management

Redesign: Developed dashboards on mobile phones for CHAs to manage performance, including tracking those who have reported and providing quality checks.

Changes made to cStock to respond to the challenges identified and ensure sustainability

As cStock expanded to ASAL counties and attention increased from other areas including the Ministry, spurring additional changes:



Integration of cStock with KHIS: work with MOH to integrate cStock with with the National DHIS2 aggregate, the Kenya Health Information System (KHIS).

Development and exploratory implementation of the transactional cStock version, which enables CHVs to submit real-time logistics data as they carry out their tasks. These include household registration, dispensing, receiving commodities, and stocktaking, providing real-time visibility of commodities.

Solar phone chargers for CHAs from the ASAL counties to address continuous power outages, to enable them stay in touch with CHVs.

Call center for enhanced user support: A call center provides cStock users with relevant information, helps them troubleshoot issues associated with this mobile technology and works to improve the user experience. The call center used voice calls, SMS, and WhatsApp to communicate with users.

Hybrid paper to digital technology enabled CHVs to streamline data capture by using smart-feature phones and PaperEMR*, which entailed taking a picture of paper forms, immediately converting the data digitally, and automatically uploading data to cStock. This helped further address low literacy, low connectivity, and limited smartphone use. It also removed a step for data entry and automated the transition from manual to digital reporting, reducing the time burden on CHVs and their supervisors.

**PaperEMR is a technology solution developed by Health-E-Net and adapted for cStock implementation in partnership with inSupply Health*

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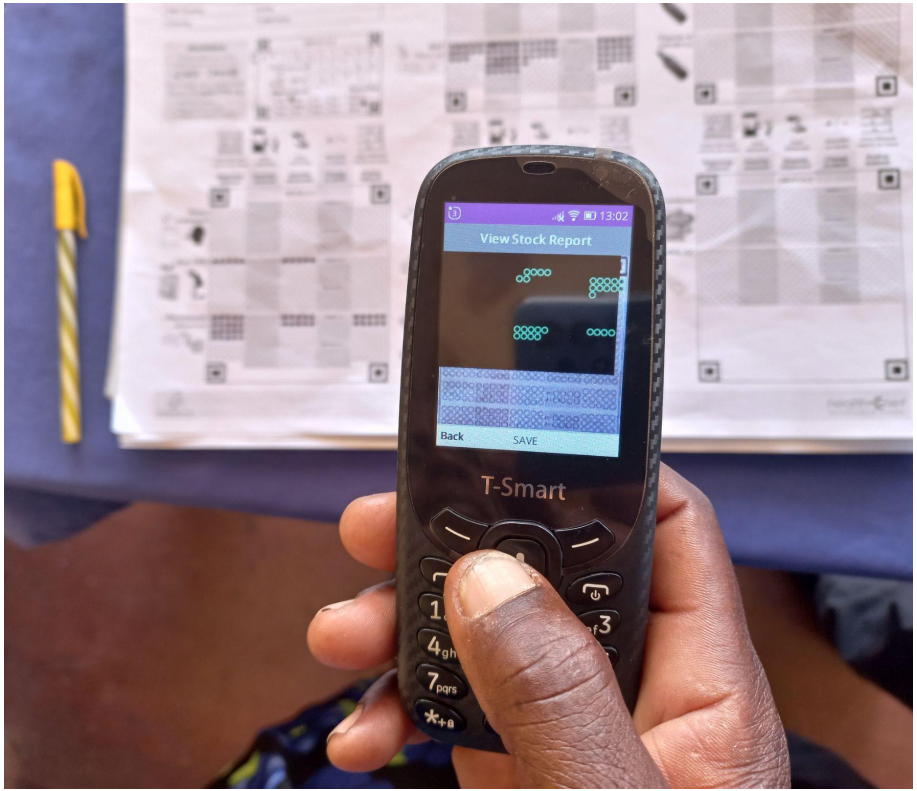
RESULTS

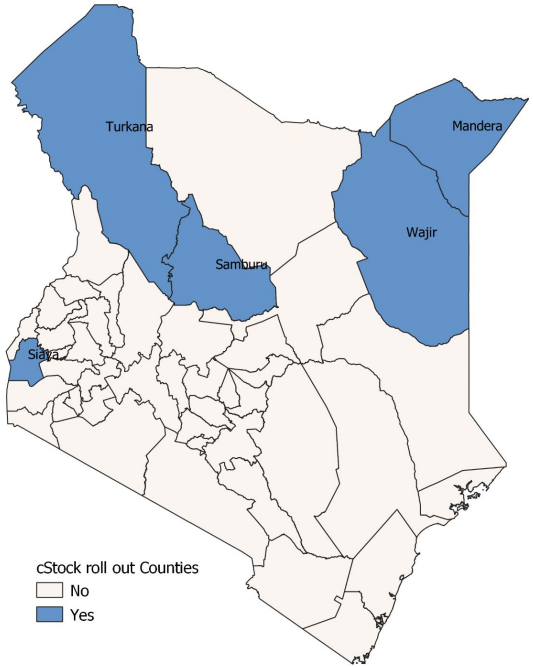
Results include improvement in reporting, usability, and data visibility and use

Results: Reporting

In the 5 implementing counties, cStock consistently increased reporting – and thus data visibility – even after support ceased, with variability across counties reflecting the challenges in different regions



cStock successfully rolled out in 5 counties to nearly 4,000 users



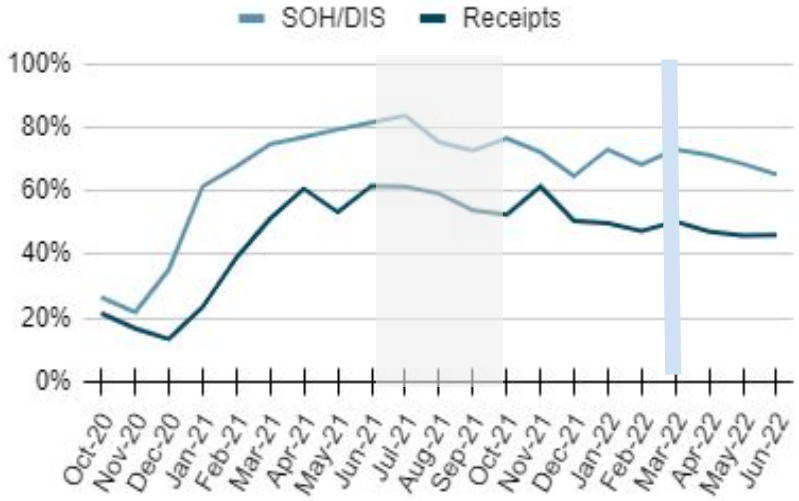
cStock users by county and cadre

County	CHVs	CHAs	HFICs	Managers	Total
Siaya	2,127	152	160	40	2,479
Samburu	534	20	0	11	565
Turkana	460	45	0	13	518
Mandera	70	10	0	24	104
Wajir	110	21	0	18	149
Total	**3,301**	**248**	**160**	**106**	**3,815**

cStock increases reporting and rates remain steady even after support ceased

cStock implementation began in October 2020. A total of 3,301 CHVs were expected to submit reports across the five counties, majority from Siaya county (2,127). **Overall, reporting rates for SOH/DIS and Receipts rose drastically from about 25% to 60%.**

During the period when inSupply provided light support, between June and September 2021, reporting rates dipped slightly but **remained higher than reporting rates at the beginning** of cStock implementation. This pattern varied between counties.



Data from all the 5 counties

Support transition period

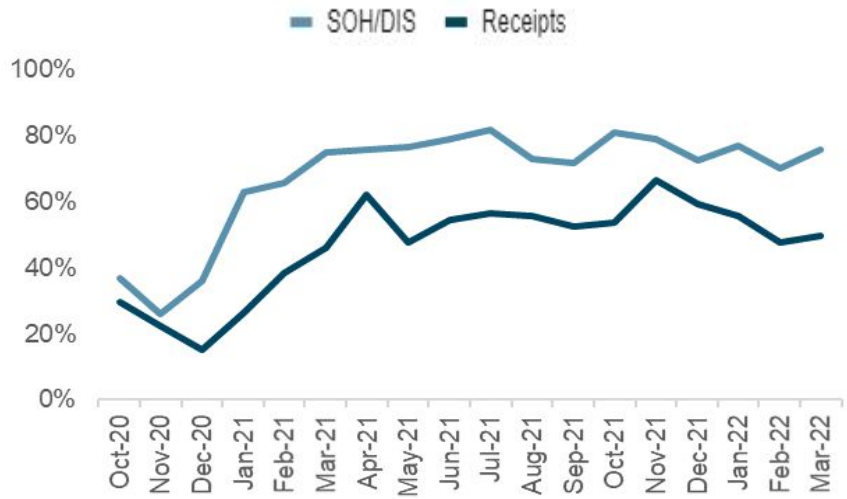
Call center introduction

Siaya County demonstrates highest reporting rate due to consistent use of data, supportive tools, and recognition

Overview: Between 2017 and 2020, cStock was scaled up to all of Siaya's sub-counties. Compared to the other four counties implementing cStock, Siaya county had the highest and most consistent reporting rates even after cStock support transitioned out. Reporting went from 37% to 76% (2020 to 2022).

Success in Siaya due to:

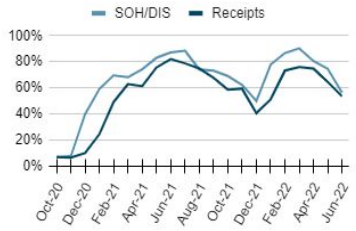
- Monthly IMPACT Team meetings were held at the sub county and community level to address supply chain issues (likely contributing to fewer stockouts at the community)
- County consistently used cStock data to inform orders and resupply
- No cost methods such as clapping, standing ovation, and praise posted to the WhatsApp group, strong performance were used for recognition and reward
- Supportive tools such as learning packages, SOPs, and the WhatsApp group to support all involved in cStock implementation. Manual reporting tools were also consistently supplied for users.



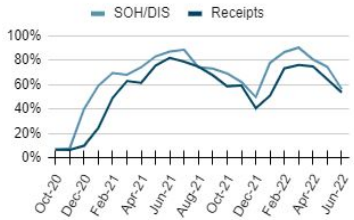
In the ASAL counties reporting rates were more variable as a results of specific challenges

While the overall reporting rate trend remained steady even after direct support ceased, the trend varied greatly across the five counties. In Mandera, Samburu, Turkana, and Wajir, we observe great volatility over time in reporting rates. In Mandera and Wajir, reporting rates dropped significantly, even reaching zero. In Samburu and Turkana, we see a slight decrease as support transitioned then an increase in Samburu or leveling out in Turkana.

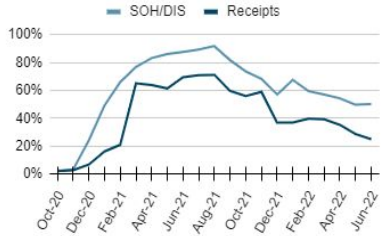
Mandera



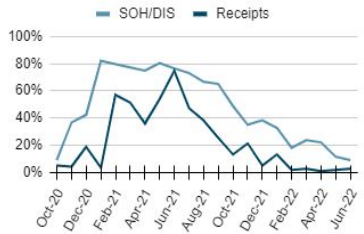
Samburu



Turkana



Wajir



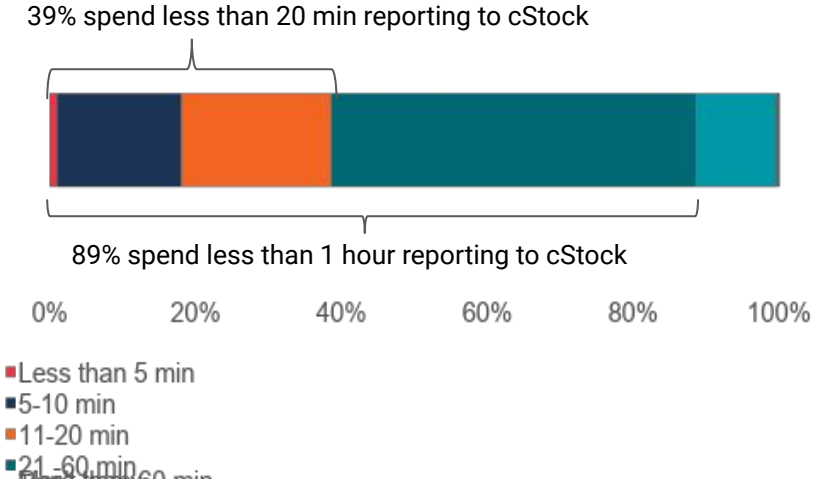
Specific challenges that impacted reporting rates include high staff turn over, migration of the nomadic populations (including families and the CHVs) during prolonged drought, as well as conflict among the populations.

Results: Usability of the cStock Application

Users indicate cStock is easy to use and saves time; those without smartphones were able to participate by USSD although they found this more challenging because of frequent timeouts.

CHVs find the cStock reporting tool easy to use, and note that it cuts down on reporting time, and lightens the workload

Time spent per CHV reporting to cStock



99 Percent of CHVs that say cStock has saved them time when collecting products

98 Percent of CHVs that find cStock easy to use

cStock streamlined reporting and saved time

CHVs have a good understanding of cStock and find the reporting forms and smartphone application simple, easy and efficient. As opposed to previous CBD reporting structures, cStock has reduced unnecessary trips to the facility to collect products, when products and/or CHAs may, or may not, actually be there.

cStock has also helped cut back on the routine paperwork, both in terms of management and time. Before, CHVs were reporting with paper tools, which often ran out and meant that CHVs needed to carry notebooks and stationary when visiting households. This was a big advantage since CHVs often lack bags to carry supplies, yet frequently are traveling relatively far distances on foot or bicycle. Being able to record data immediately and easily has helped reduce “lost” data.

CHVs also reported that the systems “nags” or alerts are very helpful and have increased their on time reporting.

> *“The good things I have seen while dealing with cStock is that it gives me an easy time when I receive the commodities….I don’t just walk anytime into the facility. When I am in my house but I don’t have [to go] to the facility. I simply request via the phone and I will be notified when stocks are available to go and collect rather than walking physically to the facility to inquire about the drugs. Sometimes, the CHA might have gone to a certain meeting so this saves me time.”*
> *-CHV*

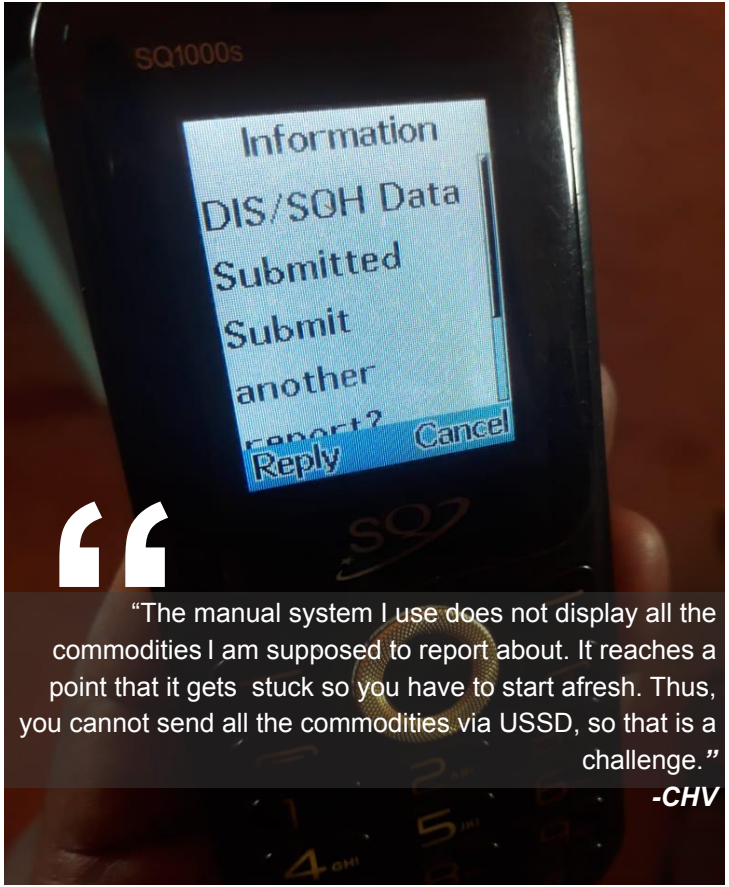
> *"I just open the cStock wall go to monthly report. It just talks to me like a human being, [asks for] stock on hand, dispensed, emergency. So I just click and send it though!...If the report goes, it writes to me ‘successful’ and tells me thank you. Therefore, it has given me easy task of sending report compared to how I used to send it.”*
> *-CHV*

Prior to cStock implementation, Samburu County, did not allow CHVs to manage commodities because of fears of accountability; after cStock adoption, 534 CHVs manage a list of 11 products, enabling better service to their communities.

Nearly 80% of CHVs preferred to use the Android application over the USSD feature

During the cStock redesign, it was clear that not all CHVs had a smartphone. cStock was then reconfigured with the option to use USSD where users can use a feature phone without internet access. Users can submit their logistics data at no cost by dialing *384*56# and following the instructions. The data sent via USSD is then integrated with data sent via the app and all data is available in the DHIS2 platform.

While 41% currently use the USSD method for submitting data, users find this method cumbersome, time intensive, and sometimes times out before all data is entered.



“The manual system I use does not display all the commodities I am supposed to report about. It reaches a point that it gets stuck so you have to start afresh. Thus, you cannot send all the commodities via USSD, so that is a challenge.”

-CHV

Results: Data visibility and use

Consistently improved data visibility helped with management of scarce resources, improved accountability and data transparency, and enhanced trust in CHVs who more consistently had products in stock.

CHAs, Sub-county and County officials see cStock as an important accountability tool

CHAs particularly appreciate cStock's visibility; specifically, who has reported and when. This helps with targeted support to CHVs who might need additional help. They can also follow consumption data, as cStock report adds a layer of accountability.

Similarly, Sub County and County officials find the dashboards helpful to track commodities. This cadre also sees a lot of value in the CHA cross learning sessions and IMPACT Team meetings, which facilitate the sharing of successes and collective problem solving.

"It has because, looking at the 4 main indicators, which are reviewed at the end of the month, we have been able to access the dashboard. And in the dashboard we could see performance indicators in terms of reporting rate. The CHVs who are reporting and those who are not reporting so it is a component that has really helped us.
-Sub County/County official

"You know in the past we could not account for most of our commodities. But now this thing [cStock] brought that kind of accountability where we are able to monitor which commodity has been consumed by who and what are the balances that we have. So it has helped us in the monitoring of our commodities and the use in the community."
-Sub County/County official

"I've witnessed that there is provision of a kind of sharing. Where CHAs are brought together and they share the best practices they are during with colleagues. And improve on their areas. This used not to happen before. It is a plus to us. It has created that forum of sharing best performance. Secondly, I think it is helping even pharmacists with monitoring the stocks in the county. In the supply chain indicators-like the stock outs there is quite an improvement. As I told you, when we have a system to detect who is doing checks and balances, then we are able to act immediately. Not like before where we just used to do things haphazardly.
-Sub County/County official

Sub County level IMPACT Teams met more consistently than community level teams, due to shortage of stock for resupply

Despite challenges during COVID-19, **Sub County level IMPACT Teams met relatively consistently.** Routine monitoring data showed that IMPACT Team meetings were utilizing the proper agendas, conducting root cause analysis and developing action plans. There has, however, been a gap in implementing action plans, an area for further support.

Community level IMPACT Team meetings were meant to be a routine component of cStock, and were to be synced to monthly resupply visits to minimize CHVs needing to travel to the health facility. **Respondents noted that when stocks were there, IMPACT Team meeting happened.** However, when there was no stock CHVs didn't see the need to travel to the facility if they were not going to be resupplied.

75 Percent of Sub County IMPACT Team meetings held, March – June 2021

> *"I have never done [an IMPACT Team meeting] since it is pointless to do so. Given that at the back of my mind I know that the facility does not have drugs."*
> *-CHV*

Community level IMPACT Team meetings provide an opportunity for CHVs to ask both supply chain and service delivery related questions

While community level meetings happened less frequently, CHVs and CHAs felt they provided a valuable opportunity to ask the HFIC questions, and get a better understanding of why certain commodities were stocked out. CHVs also noted that IMPACT Team meetings helped generate solutions to service delivery challenges such as how to deal with community members who refused testing and immunizations.

"The benefits I have noticed in such meetings is that they push things faster. You know without proper minutes our problems cannot be known. We bring problems from the village and they are discussed hence work becomes easy."
-CHV

"Those who don't want their children to be tested or even those who don't want CHV to visit them in the household, we were told that if you face such a challenge you can always take the village elder and you go with him. Then you also go with the lead CHV, the person will be talked to until he calms down. So we always bring such challenges to the IMPACT Team and they advise us appropriately. If we have shortage of commodities, the IMPACT team helps us get commodities."
-CHV

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CHALLENGES TO IMPLEMENTATION

Challenges to cStock Implementation

Across the multiple evaluation methods, we found positive results. However, challenges still remained.

The biggest threat to continuous adoption of cStock and to an extent community based healthcare is inadequate supply of commodities

By far the biggest challenges cited by CHVs and CHAs was the inconsistent and unbalanced flow of commodities. This threatened the continuous adoption of cStock as CHVs were discouraged to provide reports when they had not been supplied with commodities for a long time. The cStock approach emphasized reporting notwithstanding the availability of commodities. The unavailability of commodities was not just at the community level but also in the facilities. When CHVs have limited stock, it fuels a lack of trust between community members and CHVs.

cStock's ability to improve data visibility and linking it to KHIS, enabled managers to look at inventory levels at facilities and communities side-by-side for the first time, thus enabling them to pinpoint the root causes of low stock, including insufficient data, inadequate inventory management or an upstream supply issue.

	Community stock levels	Linked facility stock levels
Overstocked	Above 3 MOS	Above 6 MOS
Stocked between min & max	Between 1 & 3 MOS	Between 3 & 6 MOS
Understocked	Less than 1 MOS	Less than 3 MOS

	CHV self reported stockouts in last 30 days	% of CHVs stocked out as per cStock dashboard as at June 2021	MOS/Stock status according to cStock data	MOS/Stock status at linked health facilities
Water Treatment	74%	88%	0.78	Not available
Zinc/ORS	68%	75%	1.77	4.9
Albendazole/ Dewormers	81%	88%	0.68	8.2
Paracetamol	80%	90%	0.49	1.77
Male Condoms	73%	84%	0.48	10.8
RDTs (Malaria Test Kit)	47%	67%	0.69	0.7
ACT (1x6)	64%	82%	0.64	2.5
ACT (2x6)	54%	83%	0.55	1.4
ACTs (3x6)	65%	89%	0.59	1.5
ACTs (4x6)	60%	82%	0.57	1.4
Pregnancy Determination Kit	77%	85%	3.67	6.4

Underlying challenges impact cStock implementation and outcomes

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Logistical

Logistics performance is a strategic factor which indicates effectiveness of the supply chain. The ASAL counties have had significant challenges when it comes to logistics. Many of the health facilities are located in areas with poor road networks that make it a challenge for most of the community health workers to perform effectively.

Network

Reporting proved difficult in areas with poor network as the application requires the use of internet and mobile data services. Therefore, poor network connectivity was a barrier to continuous reporting by CHVs. cStock had offline capabilities, however, the report can only be sent when one is in a network coverage area.

System

cStock provides a solution to some supply chain related challenges, however, systemic issues impact product availability. For example, while policies exist for CHVs to manage life saving commodities, the required approvals from leadership at the county level are sometimes not granted.

CHV Motivation

CHVs feel strongly that their engagement is worthy of consistent financial remuneration, commensurate with the workload and time commitment. The few that are given the stipends felt they are too small and irregularly paid. This impacted on their overall motivation to work including implementation of cStock which was sometimes viewed as an additional work.

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RECOMMENDATIONS & CONCLUSIONS

Recommendations & Conclusions

Community based health care and it's delivery through CHVs has the potential and transform health care in Kenya and meet the national UHC goals. The cStock approach has already proven to strengthen supply chains in support of this goals. We propose a number of recommendations for future implementations based on our experiences.

Technology alone will not resolve supply chain challenges, it needs to be paired with engaging people and using data

The approach we used was not just technology, cStock combines the use of m-health, IMPACT Team data use approach, and user friendly dashboards. This ensures that the teams that are involved in the supply chain inculcate a data use culture where they routinely review their performance, identifying root causes and coming up with actionable solutions that are documented for follow up.

Engaging users in the design of a system (using HCD) ensures that it is applicable and appropriate in various contexts

The cStock approach was effective in a variety of different settings – from the ASAL counties to those that were fairly urban. The main reason was because it was appropriately adapted using HCD. There is need to always ensure that you employ human centered design to come up with a solution that could work in different context (forgotten/asal countries). Through HCD, we were able to identify ways of making cStock work for low literate CHVs and providing solutions for majority of CHVs that had feature phones. For example, most m-health solutions that exist in Kenya tend to be Android based whereas majority of CHVs own and are comfortable using feature phones, which were used in this case.

Recommendations & Conclusions

Technology can help but there is a need to address the chronic shortages of commodities

Even the most sophisticated supply chain system or application won't work if we do not address the chronic shortage of commodities that threatens access to healthcare services. Chronic shortages of commodities cause CHVs to be discouraged and to stop reporting, as they did not see the value of reporting when in actual sense, they did not have commodities. Shortages of commodities also cause communities to lose trust in the healthcare systems. We recommend closely working with both National and County MOH to address systemic stock out challenges by reviewing and addressing root causes.

Need to integrate supply chain within broader health information system to reduce the burden of CHVs using multiple systems

There are existing community health information systems in the country, however, these systems are siloed according to disease specific areas and do not include supply chains. inSupply has started working with MOH and other partners to use the cStock experience to enhance eCHIS so that the country can have systems that include both service and commodity data.

Thank you!

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