Evaluation of the national scale-up of SMS for Life in Tanzania

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This evaluation was financed by MMV and executed by Dalberg. All views represented in this evaluation are those of Dalberg and do not represent the views of MMV or other entities quoted herein.

Table of Contents

List of figures

Abbreviations

ACT	Artemisinin-based Combination Therapy
DMO	District Medical Officer
eLMIS	Electronic Logistics Management Information System
ICT	Information & Communication Technology
JSI	John Snow, Inc.
LLIN	Long-lasting insecticide-treated net
MMV	Medicines for Malaria Venture
MOU	Memorandum of Understanding
MOHSW	Ministry of Health & Social Welfare
MSD	Medical Stores Department
NMCP	National Malaria Control Program
PSI	Population Services International
PSS	Pharmaceutical Supply Services (Department of MOHSW)
RBM	Roll Back Malaria Partnership
RDT	Rapid Diagnostic Test
R&R	Report and Request
SMS	Short Message Service
SP	Sulfadoxine-pyrimethamine

Executive Summary

Introduction

The lack of available Artemisinin-based Combination Therapies (ACTs) continues to hinder effective treatment of malaria in many countries. To address this issue, in 2009 a partnership between the Government of Tanzania, the Roll Back Malaria Partnership (RBM), Novartis, Vodafone, and IBM implemented a pilot called "SMS for Life" in three health districts in the United Republic of Tanzania. Using short message service (SMS) technology, health facilities reported on stock levels of anti-malarials, which provided transparency on the level of stock and on stock-outs. The pilot was lauded for reducing stock-outs of anti-malarials and even eliminating them in two of the three districts during the pilot period.[1]

Following the pilot, the partnership decided to scale up SMS for Life to the national level. This evaluation reviewed the national scale-up process and the outcomes SMS for Life has achieved since the scale-up. It was commissioned by Medicines for Malaria Venture (MMV) and conducted by Dalberg Global Development Advisors.

Background and evaluation framework

SMS for Life is a technology platform that enables health facilities to report the level of malaria medicines in stock. Health facility staff provides weekly updates on stock levels of anti-malarials using SMS. District and central level staff receive this information and can use it to avoid stock-outs of essential malaria medicines either by reallocating medicines between facilities or by sending additional stock.

The national scale-up rolled out SMS for Life to all health districts in Tanzania. The process lasted from February to November 2011. During this time Population Services International (PSI) conducted trainings for all health districts, teaching facility staff how to use the system and district managers how to access and analyze information.

We analyzed data from the SMS for Life system for the period of Nov 2011 until the beginning of the evaluation in November 2012, reviewed documents, and interviewed a wide range of stakeholders to assess SMS for Life's national scale-up. This report aims to determine how well SMS for Life functions as a tool and how well it has been implemented. We used the standard approach of reviewing the relevance, effectiveness, efficiency, sustainability, and impact of SMS for Life. To understand better how the results occurred, we derived a Theory of Change for SMS for Life, linking inputs to outputs, outcome, and impact in a logical chain.

Findings

Need for SMS for Life: SMS for Life focuses on an important issue in the health system– stock-outs of anti-malarial medicines. At the time of the national scale-up, approximately 73% of health facilities were out of stock of one or more anti-malarial products, and approximately 33% of facilities were completely out of stock of ACTs.

[1] RBM statement from 21 April 2010: http://www.rollbackmalaria.org/globaladvocacy/pr2010-04-21.html

Implementation of the national scale-up process: The national scale-up was conducted efficiently**.** Deliverables were on time, at reasonable cost, and of good quality. The Memorandum of Understanding (MOU) among partners was finalised in January 2011 and PSI started training sessions in February 2011. Over the next ten months, PSI reached 375 district officials and 5,099 health facility workers, and spent 96% of the USD 606,000 budget. Central Government staff did not participate in the training due to budget issues, creating the perception of a PSI-owned intervention.

Use of the system by health facilities: A low (<10%) and falling share of incorrectly formatted stock submissions shows that SMS for Life is easy to use. During the pilot phase, response rates were consistently above 90%. However, nationwide response rates after scale-up started at 80% and fell to 67% by the end of the study period.

Evolution of stock-outs: Following the national scale-up of SMS for Life there was a small reduction in overall stock-outs of malaria medicines at health facilities, but not to the same extent as during the pilot phase. For ACTs, there was no clear downward trend in stock-outs but the percentage of quinine stock-outs fell by 12% over the study period.

Health system integration – use for redistribution and planning: SMS for Life captures stock levels but not stock deployment. Hence, the evaluation cannot show whether SMS for Life has been used to redistribute medicines between health facilities or to deploy additional stock. Interviews suggest that some District Medical Officers (DMOs) have used SMS for Life to redistribute stock. Currently, the National Malaria Control Program (NMCP) only uses the system informally to advise the Medical Stores Department (MSD) on upstream supply chain management. MSD does not formally use SMS for Life to inform central or zonal planning.

Health system integration – integration with other programs: SMS for Life exists next to other programs addressing similar issues (ILS Gateway and eLMIS). It is not currently integrated with these programs, creating parallel processes and additional work for health facility and district staff.

Government ownership: Government ownership has been limited to date. Central ministry staff did not participate in the rollout. Steering committee meetings, led by the Government, did not take place as often as planned. Furthermore, the Government struggled to secure funding to maintain SMS for Life going forward and responsibility within the Government shifted between departments during scale-up.

Alignment of stakeholders: Interviewees expressed different expectations regarding how SMS for Life should be used. Some saw it as a tool for redistribution, while others saw it as a tool to guide upstream supply chain decisions. The MOU guiding implementation does not define how data will be used to reduce stock-outs. Differences in stakeholders' expectations were not resolved during the national scale-up process.

Outcomes and impact to date: SMS for Life has improved knowledge on stock levels for malaria medicines at the facility level, but has not led to a clear reduction in stock-outs to date. Better stock information has not translated into a more efficient supply chain. The system's impact on lives saved cannot be established, due to the short evaluation period, small changes in stock-outs, and data limitations.

Programmatic relevance and sustainability: Low availability of ACTs at the national level limits the capacity to reduce stock-outs at the health facility level. Furthermore, the system is not integrated vertically or with other programmes, which reduces its relevance. SMS for Life's programmatic role in the Tanzanian health system should be clarified to increase its relevance and sustainability going forward.

Financial sustainability: An immediate financing threatens the continued functioning of SMS for Life. Interviews suggest that from July 2013, financing through grants from the Global Fund to Fight AIDS, Tuberculosis and Malaria may be available. Stakeholder opinions differ on the appropriateness of the cost, return on investment and overall value of the system. These differences should be resolved to ensure its financial sustainability.

Recommendations

Management process: We recommend that partners reduce their role in managing SMS for Life and pass leadership to the Government, in order to resolve the issue of ownership. Partners should be available to provide advice to the Government.

Design and use of SMS for Life: We recommend that the Government and SMS for Life partners set clear goals and processes to use the information generated by the system for better supply chain management. To date, expectations and work processes are not clear. We also recommend that the Government and its partners review options for integration with upstream supply chain management and similar systems (e.g., ILS Gateway). Furthermore, the Government should assess whether it wants to expand SMS for Life or other systems horizontally (e.g., into other medicines) at the health facility level. This should help increase the system's value for health facilities, district managers, and supply chain managers.

Conclusion

The pilot programme of SMS for Life states in its findings that a simple technology can be used to improve the transparency of anti-malarial stock levels and ultimately to reduce stock-outs at the health facility level. National scale-up has unfortunately not yielded the same results. This evaluation shows that the technical platform works well and health facilities are able to provide stock information reliably. However, the national scale-up has also shown that management and integration of such a system at the national level is challenging.

SMS for Life was implemented successfully as a technical tool, but the scale-up's supply chain outcomes have been less encouraging. This may in part be due to national ACT shortages that occurred at the same time as the national scale-up, or to the system's segregation from upstream supply chain management and other facility-level programs,

which inhibits its utility in resolving supply bottlenecks effectively. In order to create lasting and sustainable impact, the Government needs to decide how it will manage the pharmaceutical supply chain going forward and what role SMS for Life should play in the process.

1 Introduction

Malaria is a major health burden in the developing world, particularly in Africa. The World Malaria Report 2012[2] recorded 219 million malaria cases and approximately 660,000 malaria deaths in 2010. According to the Roll Back Malaria Partnership (RBM), 91% of deaths happened in Africa and 86% of deaths were children aged under 5 years old.[3]

In the past decade, the world has seen significant progress in the fight against malaria: RBM reports that mortality has fallen by 25% globally since 2000. In this time, 43 out of 99 countries with ongoing transmission have recorded more than 50% reduction in malaria cases. These improvements have coincided with a large increase in annual malaria funding, from less than USD 100 million globally in 2000 to USD 1.84 billion in 2012.[4]

Over this period, the fight against malaria has benefited from innovations in prevention, diagnosis and treatment: long-lasting insecticide-treated nets (LLINs) were developed and are now very prevalent.[5] Rapid diagnostic tests (RDTs) simplified detection of malaria. Artemisinin-based Combination Therapies (ACTs) offered an effective alternative to chloroquine and sulfadoxine-pyrimethamine (SP) treatments, which were becoming increasingly ineffective.

The World Health Organization (WHO) now recommends ACTs for first-line treatment of uncomplicated *P. falciparum* malaria.[6] In many countries, ACTs can be obtained only in health facilities or pharmacies and with a prescription. However, in many facilities, medicines are lacking. Such is the case in Tanzania, where the SMS for Life pilot evaluation noted that supply chain inefficiencies mean health facilities are often out of stock.[7]

SMS for Life was piloted in 2009 by a partnership between the Government of Tanzania, Roll Back Malaria Partnership, Novartis, Vodafone and IBM. The pilot ended in early 2010 and led to a decision to scale up the system to the national level. The national scale-up was financed by the Swiss Agency for Development and Cooperation (SDC) and Medicines for Malaria Venture (MMV). This evaluation reviews the national scale-up process of SMS for Life. It looks at how well the national scale-up process was implemented and what the outcomes of the national scale-up process have been.

The evaluation was commissioned by MMV and implemented by Dalberg Global Development Advisors, a strategic advisory firm focusing on international development, particularly in the global health field. It reviews the relevance, effectiveness, efficiency, sustainability, and impact of SMS for Life and provides recommendations on the way forward for the system.

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[2] World Malaria Report, 2012 World Health Organization, p. xiii

[3] http://www.rbm.who.int/keyfacts.html, accessed 22 January 2013

[4] World Malaria Report, 2012 World Health Organization, p. x

[5] The World Malaria Report 2012 estimates that 33% of the population in Sub-Saharan Africa sleep under an ITN, up from <5% in 2000, ibid., p.24

[6] Guidelines for the Treatment of Malaria, 2010, World Health Organization

[7] SMS for Life - Tanzania Pilot Project Report, 2010, Roll Back Malaria

2 Context

2.1 Background

2.1.1 Functioning of SMS for Life

SMS for Life is a technology platform that helps health facilities report the level of malaria medicines in stock. Using mobile phones, health facility staff provides weekly updates on stock levels of essential malaria medicines using short message service (SMS). The system allows staff to enter the stock levels for four different dosage levels of ACTs and for quinine. The ability to report levels of SP and RDTs was added to the system after the pilot, but this function has not been used to date.

The evaluation report on the SMS for Life pilot[8] describes in detail the system's operation, which has not changed since the pilot phase. Hence, we refer readers to the pilot phase evaluation report for a full description of the system's technical details and functioning.

2.1.2 SMS for Life pilot

The pilot for SMS for Life was launched in October 2009 in three rural districts in Tanzania, Kigoma rural, Lindi rural, and Ulanga. At the time, it was assumed that the lack of stock information at the level of primary health facilities undermined access to ACTs. Indeed, at the beginning of the pilot phase, 78% of participating facilities had a stock-out of at least one ACT dosage form.[9]

The SMS for Life pilot lasted from October 2009 to the middle of February 2010 and took place in Kigoma rural, Lindi rural, and Ulanga districts. It had three objectives:

1. Demonstrate that visibility of weekly stock levels of five key medicines at the outer edges of the Tanzanian public health system, i.e., the health facilities, will promote action to eliminate and/or reduce stock-outs, thereby significantly improving access to these essential medicines.
2. Demonstrate that a state-of-the-art data-gathering infrastructure can be made available via simple, basic, everyday tools like SMS and mobile phones, to people situated in the remotest locations in sub-Saharan Africa.
3. Demonstrate the effectiveness of a public-private partnership model.

Health facility staff would report stock levels by SMS using mobile phones. District managers would then be able to use stock information to redistribute medicines from facilities with high stock levels to those with low levels or to coordinate emergency deliveries of additional stock.[10]

At the end of the pilot, the evaluation report noted the following results in relation to the pilot's objectives:

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[8] SMS for Life, Tanzania Project Report, Roll Back Malaria Partnership, http://www.rbm.who.int/docs/SMSdetailReport.pdf

[9] SMS for Life, Tanzania Pilot Project Report, Roll Back Malaria Partnership, p.28

[10] http://www.rollbackmalaria.org/globaladvocacy/pr2010-04-21.html

Objective 1: "The SMS for Life pilot provided, for the first time ever, reliable weekly stock information on anti-malarials at the health facility level, and this visibility has supported stock management and the elimination of stock-outs. […]"

Objective 2: "The SMS for Life pilot has shown that accurate stock level information can be collected from rural health facilities on a weekly basis using simple SMS technology and that the information can and will be accessed by the parties it is most pertinent to."

Objective 3: "The SMS for Life pilot created a unique public-private partnership model that enabled the problem to be precisely identified, a technical solution to be designed, built, and implemented in three rural districts in Tanzania all in under one year."

At the time, the pilot was reported to be a success, as stock-outs fell sharply over the pilot period. Lindi rural achieved zero stock-outs by the pilot's eighth week and maintained these until the end of the pilot, with two exceptions. Ulanga reduced stock-outs from 87% to 30% by the end of the pilot, and Kigoma rural reduced stock-outs from 97% to 47% by the end of the pilot.

2.1.3 National scale-up

After the completion of the pilot there was a gap until the national scale-up process started. During this time, the project partners and the Government worked towards an agreement on the scale-up. The scale-up was envisaged to last from September 2010 to April 2011, according to the MOU document signed by the Ministry of Health and Social Welfare (MOHSW), RBM, MMV, Novartis, Population Services International (PSI), Vodafone, and Vodacom Foundation. This document defined the roles and responsibilities of partners in the process of bringing SMS for Life to scale. We present the MOU's description of partners' roles and responsibilities of the different partners in Annex 7.4.2.

The national scale-up intended to bring SMS for Life to all remaining districts in Tanzania. The scale-up process would focus on training health facility staff and providing district medical officers (DMOs) with mobile phones and data access plans, enabling them to access the system's information and take decisions based on this information. Population Services International (PSI) conducted the trainings for health facility staff and DMOs from June to November 2011.

2.2 Objectives of the evaluation

The objective of this evaluation is to assess the success of the national scale-up process of SMS for Life. To do so, it aims to review both the process of the national scale-up and the outcomes SMS for Life has achieved.

In reviewing the scale-up process, the evaluation focuses on how well the process has been implemented. This includes questions such as: Have training activities (covering trainers, DMOs, and health facility workers) been implemented? Have costs been appropriate? Were activities completed on time?

When considering the outcomes of the scale-up process, the evaluation focuses on whether stock-outs have changed significantly since the introduction of SMS for Life; how it has been integrated with the Tanzanian health system; and, whether the outcomes have been relevant to the Tanzanian health system.

To fulfil these objectives the evaluation of SMS for Life reviews data from November 2011, when all facilities were using the system, until the start of the evaluation in December 2012. To gain a comprehensive and comparative picture, we also asked questions about how the system has worked since the scale-up; and, how SMS should evolve in the future.

3 Evaluation framework

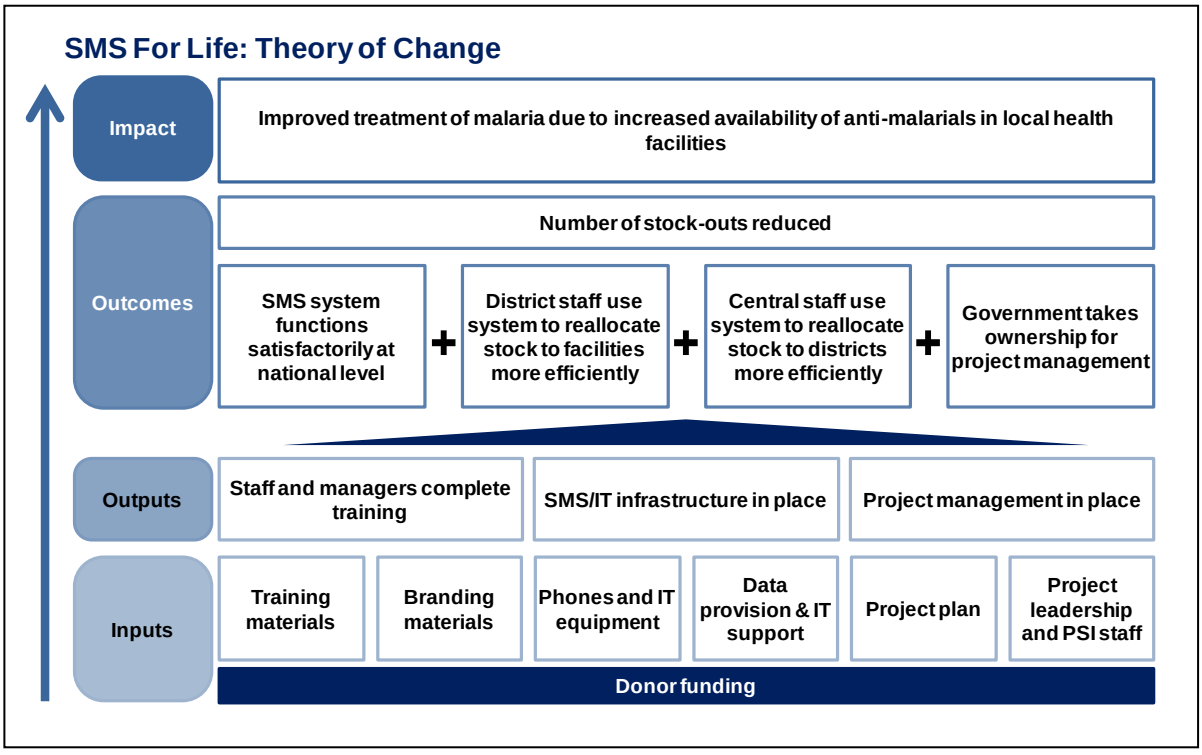
The evaluation uses the standard evaluation criteria, as laid out by the World Bank and OECD/DAC for assessing global and regional partnership programs.[11] We present findings and recommendations in four areas:

- Relevance
- Effectiveness
- Efficiency
- Sustainability

Given that it is difficult to directly attribute increased availability of anti-malarial drugs to the SMS for Life system, this report does not discuss impact.

We have devised a Theory of Change for SMS for Life to create an understanding of how the inputs of the intervention link to outputs, outcomes, and ultimately, impact. This Theory of Change is useful in understanding how SMS for Life was expected to contribute to impact goals and to identify where it succeeded and where outcomes were lower than expected.

Figure 3.1: SMS for Life - Theory of Change



The Theory of Change shows how the inputs of the scale-up process (including training materials, equipment, project leadership, etc.) were expected to generate outputs (such as staff trained, infrastructure in place, etc.) and how this would lead to the desired outcomes. Intermediary outcomes include a functioning and well-used system. The final expected outcome is a reduction in stock-outs for anti-malarials at the level of health facilities. In the

[11] http://siteresources.worldbank.org/EXTGLOREGPARPROG/Resources/GRPPguidelines.pdf

long run, the reduction in stock-outs is expected to lead to improved treatment of malaria and thus to lower mortality.

3.1 Evaluation questions

We developed a set of evaluation questions for the different levels of the Theory of Change (i.e., inputs, outputs, outcomes, impact) and for each category of questions (i.e., relevance, effectiveness, efficiency, sustainability). The full list of questions can be found in Annex 7.2. The table below summarizes of the evaluation questions, structured by category. We omitted reporting on questions of impact due to data limitations.

Relevance	• **Does SMS for Life address an issue that is important to the health system?** • **Does SMS for Life address the issue in the right way?**

Effectiveness	• **Did the scale-up of SMS for Life have the desired effects?**
	  ○ Did SMS for Life achieve the desired supply chain outcomes?
	  ▪ Did stock-outs go down over time?
	  ▪ Did health facilities provide accurate data?
	  ▪ Did health facilities use the system?
	  ▪ Did district staff use the data to redistribute stock?
	  ▪ Was system data used in other decision making processes?
	  ▪ Was SMS for Life integrated into the Tanzanian health system as desired?
	  ▪ Did SMS for Life integrate with upstream supply chain processes?
	  ▪ Did the Government take ownership of SMS for Life?

Efficiency	• **Were project outputs provided in good time?** • **Were resources used appropriately for the task at hand?** ○ Do project outcomes present good value for the cost incurred?

Sustainability	• **Are the outcomes of SMS for Life likely to persist?**
	  ○ How sustainable have outcomes been in the national scale-up of SMS for Life?
	  ○ What is the evidence that outcomes can be sustained in the future?
	  ○ What are challenges to sustainability?

3.2 Methodology

This evaluation report is based on four main sources of data:

- Relevant project documentation
- SMS for Life data downloaded from the system
- Interviews with key Government representatives, project partners, and external experts
- External documents

Document review

We collected project documentation on SMS for Life as available. Project documentation includes publicly available documents and confidential documents shared by the project partners. We reviewed both based on the evaluation questions and framework. The list of documents we reviewed is contained in Annex 7.2.1.

Data analysis

SMS for Life data was downloaded directly from the SMS for Life portal with the consent of the Tanzanian Government as part of the evaluation process and with the permission of MMV and Matssoft, the operators of the SMS for Life software portal. We used reported data from 9 June 2011 until 29 November 2012, analyzed log-in data to determine use, and tracked chaser SMS[12] sent by the system to determine the share of falsely submitted messages.

We conducted statistical analyses using Microsoft Excel and R, a statistics package. To determine supply chain outcomes, we conducted analyses of the share of facilities out of stock under three different scenarios:

- Share of facilities with all dosage forms of ACTs out of stock
- Share of facilities with one or more dosage forms of ACTs out of stock
- Share of facilities with quinine out of stock

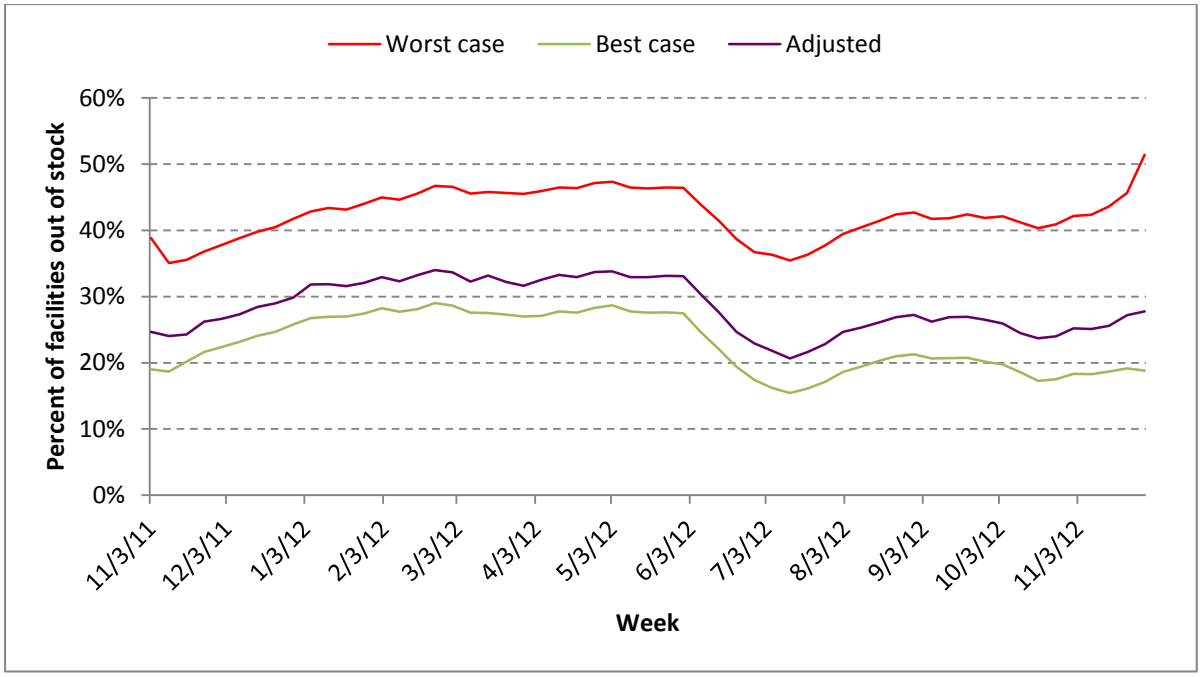
One particular challenge in the data is the share of non-responses: every facility that does not submit data to SMS for Life introduces uncertainty. This facility could either have stock or be out of stock. There are three possible ways to correct for this:

- Assume that all non-reporting facilities have stock. This is the most optimistic scenario and yields the lowest stock-out rates.
- Assume that all non-reporting facilities are out of stock. This yields the most pessimistic results, i.e., the highest stock-out rates.
- Conduct a logical test and replace missing data:
    - For facilities that missed reporting up to four weeks in a row, the nearest known value (before or after) is taken.
    - For a longer period, a constant probability of stock-out is assigned, based on the average rate of reported stock-outs for that commodity over the study period.

Figure 3.2 illustrates how the different methods of dealing with non-responses affect the estimate of stock-outs:

Figure 3.2: Percentage of facilities with stock-out of all ACTs

[12] Chaser SMS are automatically sent by the system if an incorrectly formatted message is received



The lowest line is the best-case scenario. The green line uses the logical test. The blue line presents the worst-case scenario. For the rest of this report we use the logical test approach to fill data gaps.

Key informant interviews

We contacted 25 stakeholders directly via email and were introduced to, and given telephone contact details for, approximately 10 additional individuals. Not all stakeholders were available for interview, so we interviewed a total of 28 stakeholders from all key groups:[13]

- Government of Tanzania – central level
- Government of Tanzania – districts
- Project partners
- External experts

Given the focused scope and time-limited nature of the evaluation, we did not interview end beneficiaries. Instead, interviews focused on key stakeholders' expectations regarding the role and benefits of SMS for Life and the functioning of the system.

To ensure consistent quality of interviews, we used a structured interview approach. We used an interview guide based on the evaluation questions to guide conversations and collected answers in a standard data collection template. Where appropriate, we added additional questions as they emerged over the course of several interviews. For example, it emerged over the course of the evaluation that differences in expectations were important to how SMS for Life had evolved. The presence of similar interventions also had an important impact. In interviews, we guaranteed interviewees anonymity when citing their responses.

[13] The list of interviewees is presented in annex 7.3

3.3 Data limitations

The evaluation of SMS for Life is constrained in several ways by data limitations. As we note above, data availability is limited and non-responses introduce uncertainty. Furthermore, there are dimensions that the system does not capture. For example, system log-in data alone is not sufficient to estimate whether district and central staff have been using SMS for Life. DMOs receive a weekly update email from which they can determine stock levels at facilities without logging into the system.

The scope of the evaluation did not include data accuracy checks, as local data collection was beyond the scope of the study. One interviewee suggested that data from SMS for Life might be inaccurate in some cases, overestimating stock-out rates. However, this does not align with data from the pilot phase of SMS for Life.

In this report, we omit estimations of the impact of SMS for Life on malaria morbidity and mortality. As discussed later in the document, it is difficult to attribute directly to the system changes in outcomes, and as a result, any estimates of program impact would be fraught with uncertainty.

We were not able to interview all persons targeted. Finally, we recognize that interviews rely on individual recall, which can be biased. We attempted to limit bias by asking questions in an open-ended manner and by refraining from guiding responses.

4 Findings

4.1 Relevance

Finding 1: SMS for Life was designed to address an important issue in the Tanzanian health system (high ex-ante relevance)

Stakeholders from all groups agreed strongly that the stock-out of anti-malarials at the health facility level was an important barrier to the fight against malaria in Tanzania. Stock-out data presented below supports this view, showing that approximately 60% of facilities were out of stock of at least one form of ACT at the beginning of the review period, and approximately 25% were out of stock of all forms of ACTs.[14]

Finding 2: Three factors undermine the relevance of SMS for Life (limited ex-post relevance)

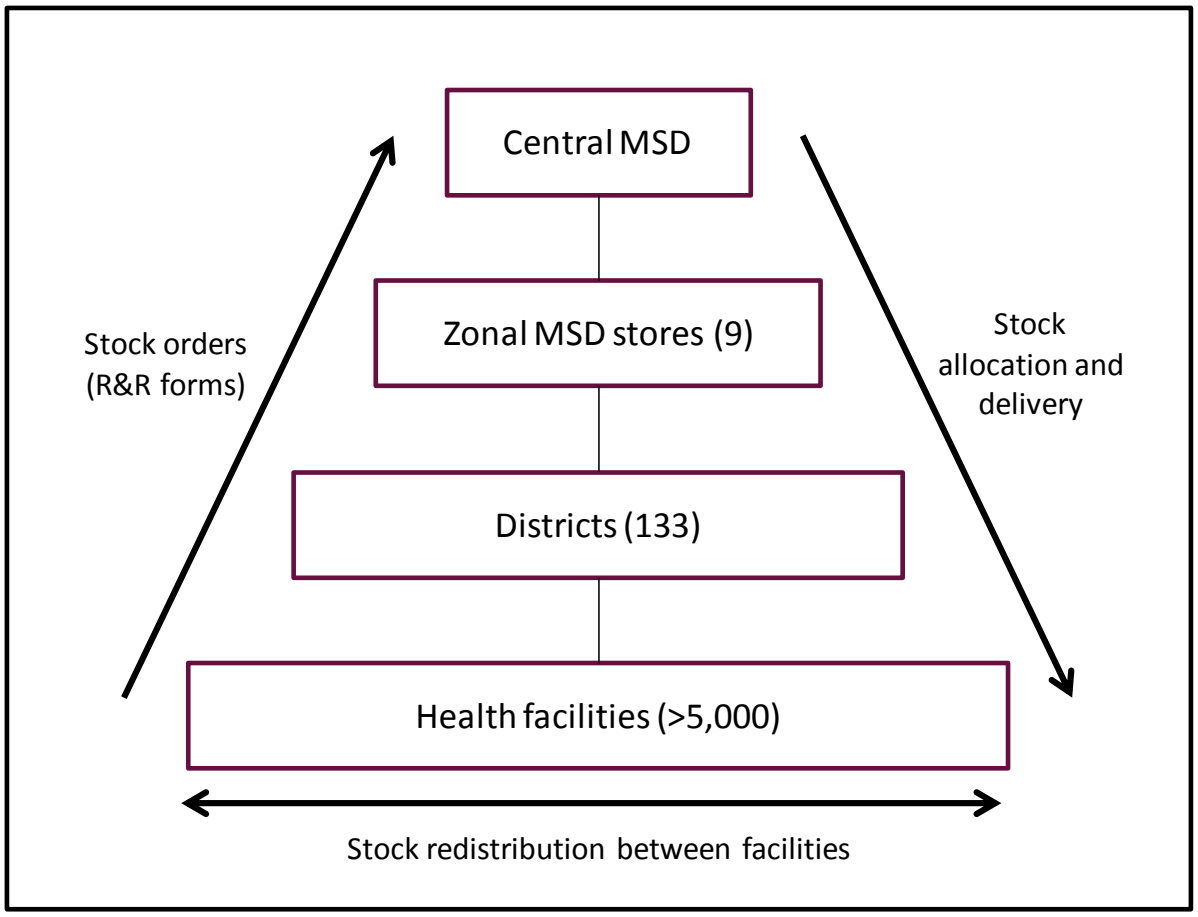
Low supply of ACTs at the national level undermines the relevance of SMS for Life. Government and other stakeholders stated that national supply of ACTs was low during the review period. Staff at the Medical Stores Department (MSD) reported that policy dictates they should have six months of buffer stock at all times. However, according to interviewees, MSD has never been able to fulfil this requirement. In fact, over the past six months, MSD's stock levels were reported between 50-60% of the target level. This is consistent with NMCP data showing a fall in public sector procurement of ACTs from 18 million treatments in 2009 to 12 million treatments in 2012.[15] At the time of writing, interviewees reported that MSD central store was experiencing a stock-out of adult dosage ACTs.

Users report that when supply is low, SMS for Life is less useful for district managers. DMOs submit stock orders to MSD zonal stores based on orders placed by facilities at the district level. When supply is plentiful, DMOs can alleviate stock-outs at facilities by redistributing from facilities with surplus stock. Eventually, new deliveries from zonal MSD stores replenish stock at facilities (Figure 4.1 gives a graphical depiction of the flow of orders and stocks). However, when there is a sustained shortage of drugs throughout the supply chain, no facilities have a surplus, lowering possibilities to redistribute stock between facilities.

Figure 4.1: ACT stock ordering and delivery system in Tanzania

[14] The different dosage forms of ACTs tracked in SMS for Life are targeted at different age groups. For example the adult dose has four times as many pills (and four times the dosage) as the form for babies of 5kg to 15kg body weight. We review both stock-outs of one or more ACT forms and complete ACT stock-outs.

[15] Source: Intervview with NMCP 2013.



Lack of integration with upstream supply chain management is a second challenge undermining the relevance of SMS for Life. Interviews indicate that ACT deliveries to facilities have been, on average, late and lower than expected. Furthermore, stakeholders report that MSD supply chain management processes do not use SMS for Life data when determining quantities to be delivered to facilities. Rather, the delivery system that pre-dates the introduction of SMS for Life is still used to determine these quantities. This system has two variants: one works on a 'push' basis, providing medicines at pre-determined quantities to health facilities. This system is currently being phased out. The second works on a 'pull' basis, filling delivery requests submitted by facilities.

MSD reported that many stock orders from DMOs and health facilities do not meet the required standards of accuracy or timeliness. MSD can only deliver required quantities of stock by the agreed timelines if forms are completed correctly and submitted on time. As a result of this issue, health facilities often do not receive stock deliveries promptly or at the requested volume.

According to stakeholder interviews and the MOU signed between the project partners and the Government, there were no explicit goals regarding the integration of SMS for Life with upstream supply chain management. Currently, the NMCP is responsible for advising the MSD on how to allocate stock to zonal stores. The NMCP reports that it uses SMS for Life data to inform this process. However, MSD staff is currently not trained on the SMS for Life system and therefore cannot access the data themselves to see which districts or regions

are experiencing stock shortages. This lack of stock visibility reduces MSD's ability to implement effective supply chain management and planning.

SMS for Life exists in parallel to other systems with similar objectives, reducing its value added. SMS for Life was implemented around the same time as another major effort to improve the Tanzanian health commodity supply chain, the ILS Gateway and eLMIS. ILS Gateway is also based on the collection of facility-level stock information using SMS. However, ILS Gateway reports stock levels for 20 essential medicines, along with family planning and malaria products. Health facilities report stock levels on a monthly basis and facilities are also required to send an SMS when they have submitted their report and request (R&R) forms, and when they receive deliveries, indicating the quantity of those deliveries. The system is accessible by MSD and MOHSW who can keep track of stock status at all facilities. The system is sponsored by USAID and implemented by JSI. So far, the ILS Gateway is operational in more than 1,600 health facilities and will be running at national scale by September 2013.

Following the development of the ILS Gateway system, eLMIS is the next phase of a broader effort to improve the supply chain for medicines using information technology. eLMIS will enable R&R[16] forms to be submitted and tracked online, avoiding the current requirement that DMOs collate and send orders to MSD zonal stores. Once up and running, eLMIS will be able to integrate data from ILS into its system. It will also be designed to include SMS for Life data, although there is currently no plan for the two systems to integrate fully. eLMIS is also a USAID-sponsored system, and development is due to be completed by June 2013. It will then be rolled out to MSD zonal stores by September 2013, and will be used in all regional and district hospitals, as well as health centers in urban areas, by June 2014.

SMS for Life and the ILS Gateway system address similar issues. This overlap reduces incentives to participate in both, and creates redundancy of effort. Health facilities and managers are less inclined to use both, since they need to perform similar activities. The overlap also increases the risk that duplicate data will be collected, making it less clear to users which information should be used and how. Finally, SMS for Life records the stock levels of ACTs and quinine, but not for other essential medicines at health facilities. Stakeholders indicate that the narrow product focus further undermines relevance by creating parallel processes.

4.2 Effectiveness

4.2.1 Supply chain outcomes

Finding 3: Stock-outs have decreased slightly since the national scale-up of SMS for Life, though to a lesser degree than during the pilot phase.

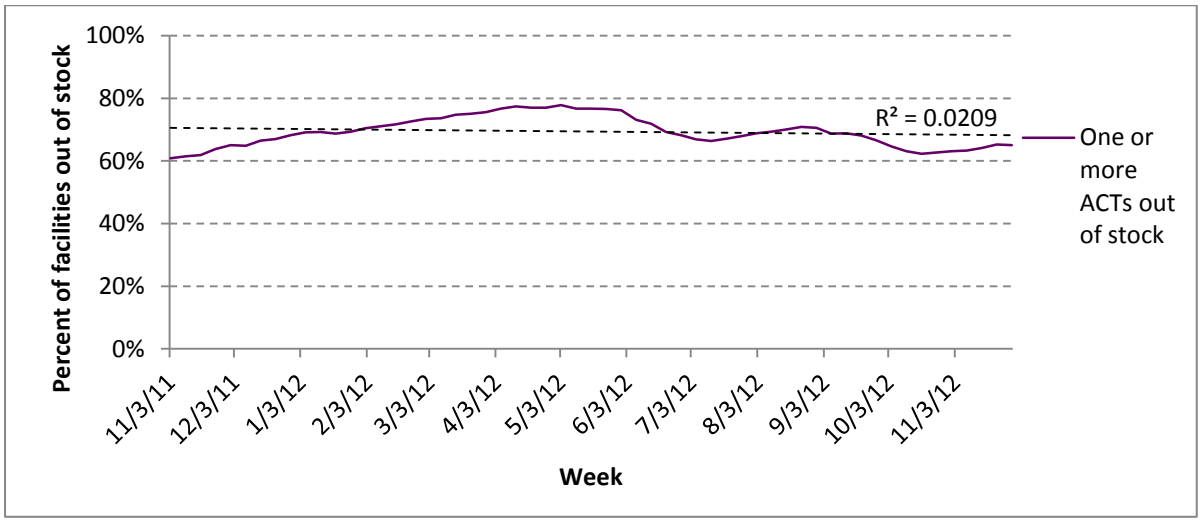
Findings on supply chain outcomes are based on the analysis of stock level data from SMS for Life. We make adjustments for missing data, as described in the methodology section.

[16] R&R forms are completed by health facilities and sent to DMOs, who then compile and send them to zonal stores. Each form contains order requests for all health commodities distributed through health facilities.

In assessing stock-out data, we consider three different indicators: share of facilities with at least one form of ACTs out of stock, share of facilities with all forms of ACTs out of stock, and share of facilities with a quinine stock-out.

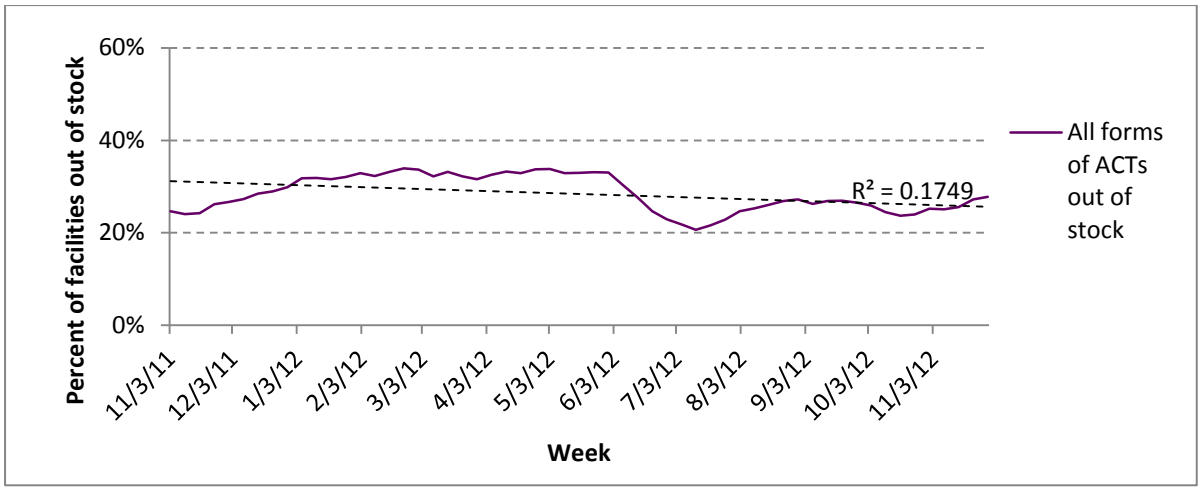
The share of facilities with at least one form of ACTs out of stock showed a flat trend, as illustrated in Figure 4.2 below. This is overshadowed by a relatively large fluctuation over the review period, as evidenced by a very low R-squared coefficient of determination of 0.02. The share of facilities stood at around 60% at the beginning of the evaluation period, increased to approximately 75% and fell to around 60% towards the end.

Figure 4.2: Percentage of facilities with stock-out of one or more ACTs



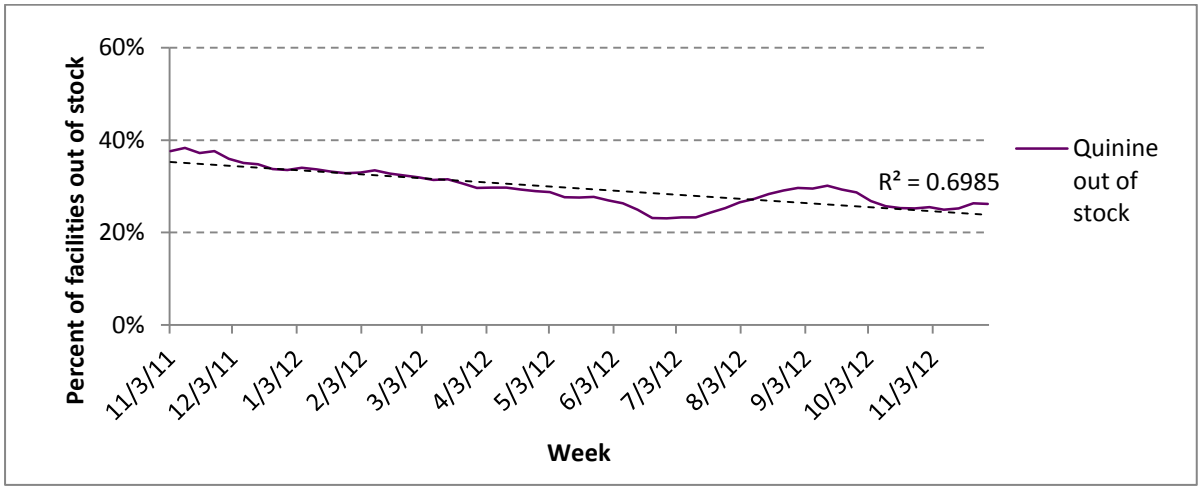
The share of facilities with all ACTs out of stock was 25% in November 2011. Again, the fluctuation over the evaluation period is large and the trend is flat. The share of facilities initially rose towards the middle of 2012, before falling again. As in the case of facilities out of stock of one or more ACT dosage forms the R-squared is very low, with a score of 0.17.

Figure 4.3: Percentage of facilities with stock-out of all ACTs



In the case of quinine, the level of stock-outs showed a clearer downward trend and the trend was more linear (R-squared of 0.69). At the beginning of the evaluation period, the level of stock-outs stood at around 35% and fell towards 25% by the end.

Figure 4.4: Percentage of facilities with stock-out of quinine



It is difficult to attribute changes in stock-outs to SMS for Life alone. Firstly, the ILS Gateway system has been active over the evaluation period and may have had some impact on stock-outs. Secondly, the extent to which DMOs used SMS for Life data to inform stock redistribution decisions is impossible to gauge, as the system was not designed to collect data on redistribution. Thirdly, it is unclear to what extent supply chain challenges (both nationally and between MSD and health facilities) prevented SMS for Life from being used as intended. In other words, a lack of surplus stock at facilities may have prevented DMOs from redistributing stock between facilities.

On the other hand increased use of RDTs may have reduced stock-outs: NMCP interviewees indicated that since the introduction of a new public health policy, stipulating that patients with fever be tested for malaria with an RDT kit, the number of RDTs in use

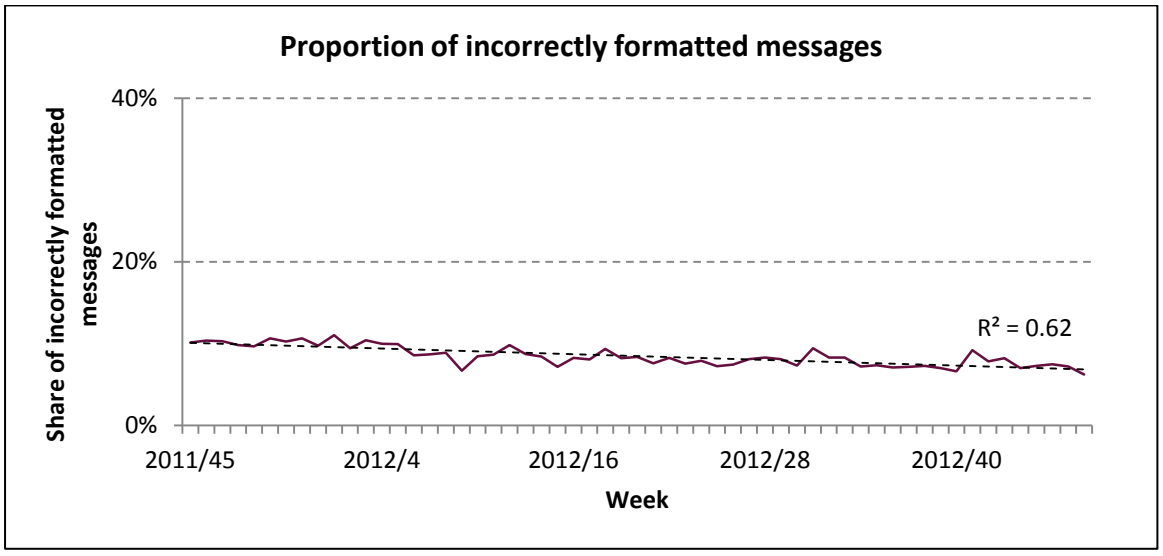
increased from 2.0 million in 2009 to 13.3 million in 2012.[17] In theory, increased usage of RDTs should reduce presumptive malaria treatment, subsequently reduce ACT consumption and, ultimately, stock-outs. In practice, it is difficult to determine the impact of increased RDT usage on stock-outs, as reports of patients still treated with ACTs despite a negative test are not uncommon. Moreover, some patients are not tested at all. Under these circumstances, it is not possible to determine clearly which factors contributed to increased or reduced stock-outs.

Finding 4: Incorrectly formatted SMS messages were few and decreased throughout the national scale-up, suggesting that the system is easy to use

The percentage of false messages submitted to the system decreased over the evaluation period, indicating that users were getting better at submitting correctly formatted stock messages.[18]

At the beginning of the evaluation, approximately 10% of messages submitted to the system triggered a follow-up message due to incorrectly formatted data. Towards the end of the evaluation period, however, the share of falsely formatted messages fell to around 6%. This relatively low share of false messages suggests that health facility staff training was successful and that SMS for Life is easy to use and that the act of submitting data does not present a significant barrier to use.

Figure 4.5: Percentage of incorrectly formatted SMSs sent to SMS for Life system each week



Finding 5: The definition of stock-outs does not necessarily capture the actual availability of stock in health facilities

During interviews, one stakeholder recalled a recent survey of health facilities administered by the NMCP, which had investigated stock-outs of ACTs. The survey showed that of 24 facilities with reported stock-outs, only two were genuinely out of stock. For the other 22

[17] Source: interviews (at the time of writing, Dalberg has requested and is awaiting for the official data).

[18] An incorrectly formatted message is one that does not follow the formatting requirements of SMS for Life and that is not understood by the system. Based on the methodological limitations illustrated in Section 3, we cannot ascertain whether data reported has been accurate or not. Physical stock counts were beyond the scope of this evaluation. This finding

facilities, there were indeed no ACTs in the stock room, but the facilities still had stock in the dispensary. While ideally all health facilities would have backup stock in stock rooms, this survey suggests that in some cases there may be remaining stock at facilities despite zero stock in stock rooms. One interviewee suggested that this disparity could explain why some health facilities do not order more ACTs despite appearing to be stocked out for long periods.

Unfortunately, at the time of writing we were unable to verify these claims, because the survey is being finalized at the NMCP. However, the survey appears to indicate that SMS for Life data on stock levels cannot fully capture the availability of anti-malarials to consumers, due to the physical layout and organizational setup of health facilities. If health facilities stock ACTs on shelves in dispensing rooms, this disparity of reported versus actual availability will lead to over-reporting of stock-outs.

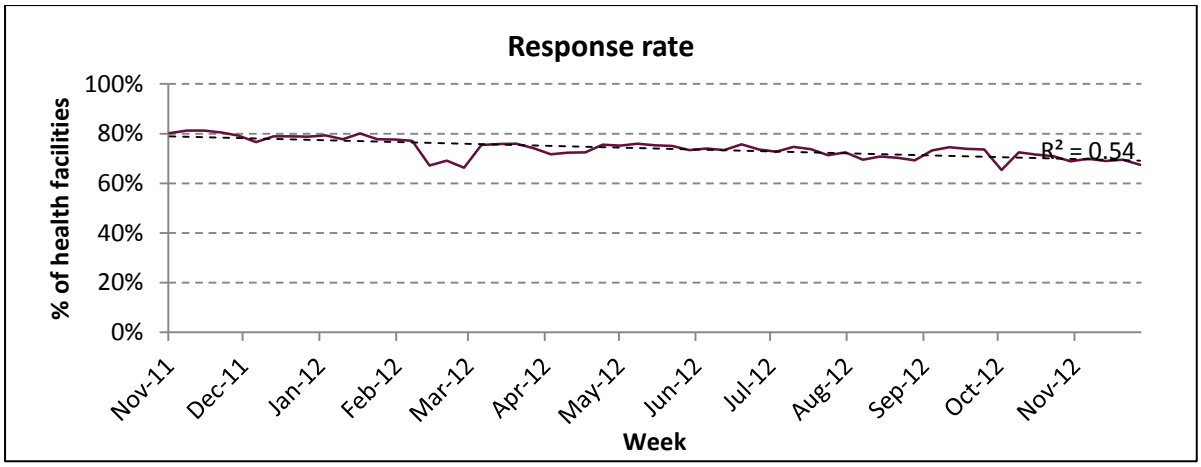
Interviewees suggest analyzing the issue further by reviewing R&R forms to determine whether facilities that reported being out of stock had ordered additional ACTs or whether they had low ACT consumption and did not require additional stock. This is beyond the scope of the evaluation and should be investigated by supply chain managers.

Finding 6: Response rates by health facilities after national scale-up were lower than during the pilot and decreased slowly over the study period

Throughout the pilot phase, response rates never dipped below 90%. At the beginning of the evaluation period, 80% of facilities reported stock levels each week, decreasing to approximately 67% of facilities by the end of the review period. There was a period of reported network outage, occurring in February 2012, explaining the lower response rate during that time.

Interviews with Government staff and external stakeholders indicate two main causes for the reduction in responses: firstly, staff turnover at the facility level increases the risk that staff has not been trained in the SMS for Life system, or that previous staff has not handed over information on how to submit data. Secondly, stakeholders report that health facilities are starting to lose interest due to the supply challenges at the national level. According to interviewees, reports of stock-outs did not necessarily lead to deliveries. If this happens repeatedly, people may lose faith in the usefulness of the system, and as a result may de-prioritize reporting stock-outs.

Figure 4.6: Percentage of facilities sending stock data via SMS each week



Finding 7: The evaluation cannot determine whether SMS for Life has been used to redistribute stock between health facilities

The evaluation cannot determine whether SMS for Life is used to redistribute stock between health facilities. The system only shows the level of stock at the facility level and does not record inflows from zonal stores or redistribution between facilities. To determine redistribution, direct documentation of redistribution would be needed, either from health facilities reporting receipt or departure of stock, or from district records of redistribution.

A small number of indicative interviews with district staff uncovered vastly differing levels of familiarity with the system and different levels of use. One DMO had not heard of the system at all, while another reported using the system "occasionally", though not for redistribution. A third DMO reported having used the system to redistribute stock on five occasions in the past year.[19]

Additional interviews indicate that it has been rare for health facilities to have surplus stock over the past year, thereby reducing the potential benefit from stock redistribution. Furthermore, some stakeholders indicate that placing emergency orders with MSD is easier than redistributing, in light of the associated logistical challenges and cost implications.

4.2.2 Integration into the Tanzanian health system

Throughout this evaluation, we consider integration into the Tanzanian health system in four ways: vertical integration into upstream supply chain management systems; horizontal integration with other programs with similar or overlapping objectives; programmatic integration, such as including a greater variety of health commodities into the system; and integration with Government management and processes.

Finding 8: Views differ on whether SMS for Life should expand to include additional health commodities in the long term

Interviewees offered varying perspectives regarding whether and how SMS for Life should be expanded across the Tanzanian health system. On one end of the spectrum,

[19] It should be noted that we reached out to six DMOs, of which three were available for interview. Information from these interviewees cannot therefore be considered as representative, and should be seen as indicative.

stakeholders saw a narrow role for SMS for Life, focusing on malaria medication and redistribution of medicines between health facilities. However, most stakeholders saw a broader role for SMS for Life. They suggested that the system should collect data on additional health commodities, and that the information should be used to steer upstream procurement and distribution processes (as discussed in Finding 9).

In interviews, Government representatives also indicated that the MOHSW made requests after the pilot to integrate additional products in the system and to include in the interface a country-level summary that forecasts stock requirements. According to these representatives, these requests were not implemented. However, data entry columns for SP and RDT stock levels were included in the system as part of the user interface, but only after training was completed. It appears that health facility staff is not aware of this capability.

Interviews and the MOU guiding the scale-up of SMS for Life suggest that partners did not come to an explicit agreement on the scope and long-term aim of the system. Therefore, stakeholders had different expectations as to the horizontal integration of SMS for Life.

4.3 Efficiency

Finding 9: Training was completed efficiently, within budget, and covered relevant topics, thus enabling rapid scale up of SMS for Life

Several interviewees noted that SMS for Life had successfully completed the formidable task of scaling up the number of districts from three to 131, particularly given the short timeframe. This is a result of PSI's efficient rollout of the training program: 138 training sessions took place between February and November 2011, through which 375 district officials and 5,099 health facility workers were trained. In addition, 42 regional officials received a basic system orientation. District staff training included the following areas:

- How to use SMS for Life reporting system
    - Extraction of basic data (stock information, response rates)
    - Editing of the health facility information
    - De-registering and registering new users into the system
- How the system operates (hands-on, live experience)
- How to train new reporting persons, in the event trained health facility workers are reallocated, and how to report challenges

Training of health facility workers included the following areas:

- How to register mobile phone numbers in the SMS for Life system
- How to compose and send the stock SMS, specifically the unique SMS format and the number to send to
- How to count stock
- How to complete a stock submission through a live simulation. The simulation exercise aimed to provide a hands-on experience to all health facility workers and

thus ensure understanding of the system. The simulation included five posters that represented five different stock situations. [20]

Training accounted for 96% of the USD 606,000 budget. PSI simplified the per diem payment process during trainings by paying all participants via M-PESA.[21]

Originally, Government officials were to be present at all 138 training sessions. However, there was no budget for MOHSW or NMCP staff to attend. As a result, workshop participants perceived the system to be a PSI-owned program and interviewees reported that several participants called PSI if they experienced problems with the system, rather than calling MOSHW's ICT staff per the original plan.

Finding 10: The national scale-up used SMS systems, telephone handsets and IT infrastructure successfully

Several interviewees mentioned that the data collection and user interface system has functioned flawlessly to date. The database has been managed efficiently, and interviewees reported no issues with viewing data on the web-based system. As previously mentioned, the number of SMS responses dipped in February 2012, but this was due to a telephone network outage across the country.

Finding 11: Stakeholders are not clearly aligned on the system's value for money

Most interviewees agreed it was difficult to estimate value for money when it was difficult to attribute improvements in stock-outs to SMS for Life. When asked for an personal perspective, stakeholders were evenly split among three broad views as to whether the project represented good value for money. Some interviewees felt that SMS for Life was responsible for a reduction in stock-outs (or an increase in availability of stock) and therefore represented good value for money. Another group believed that the system was effectively reducing stock-outs, but value for money could be improved by increasing the number of products covered. They claimed that broader coverage of products would not add cost, but would add value via greater availability of other products in health facilities. A third group suggested that SMS for Life was an expensive system to run, did not have enough impact to justify the cost, and was therefore poor value for money.

Several stakeholders, particularly from the third group, made cost comparisons between SMS for Life and ILS Gateway. These interviewees felt that ILS Gateway provides a similar service by using an open source system called RapidSMS. This system is free to use and has enabled JSI to keep running costs down to approximately USD 60,000 per year.[22] This is lower than the operating costs of SMS for Life, which are approximately USD 600,000 per year.[23] Several interviewees also felt that it would be possible to renegotiate the terms of SMS for Life's contract with its current service provider to reduce the cost by at least half; indeed, Government representatives were engaged in renegotiations at the time of writing.

[20] The sessions that did not include a live simulation (less than 5%) were subject to network interruptions, beyond the trainers' control.

[21] M-PESA is a mobile payment mechanism. Pesa is Swahili for money-

[22] This represents the direct cost of operating the system and does not include the cost of employees in other initiatives who may contribute to outcomes of the ILS Gateway project independently of the technology platform.

[23] We did not examine program budgets and therefore cannot confirm whether this cost comparison is justified by similar operational activities.

4.4 Sustainability

Finding 12: Stakeholder participation in SMS for Life has been decreasing slowly since scale-up, threatening long-term success

During the pilot phase, the system enjoyed response rates of more than 90%, and central NMCP staff accessed the system on a daily basis. Anecdotal evidence also suggests DMOs used the system to actively redistributed stock from facilities with surplus to those in deficit. Significantly, during this time, the NMCP focal point regularly liaised with DMOs and facilities to identify and address stock-outs as soon as possible.

Unfortunately, this level of participation from health facilities has not been sustained during the national scale-up. As previously mentioned, response rates at the facility level have decreased, although it should be noted that most interviewees consider a response rate of close to 70% as highly successful.

Statistics usage peaked in December 2011, when 45 users accessed stock level data in one week. Since then, users have accessed the data less frequently, with six users logging into the system during one week in December 2012. However, drop in log-in frequency may not necessarily reflect a decreasing use of statistics, as DMOs and central ministry staff continue to receive weekly status emails with the same data as is available online.

Interviewees also noted that since the pilot, the NMCP focal person had ceased following up with DMOs to ensure a corrective response to low stock levels communicated via SMS for Life, which was his role during the pilot phase. Interviewees reported the program's national scale-up budget did not include these tasks, supporting resources from Novartis, as the pilot did; therefore, the NMCP was unable to continue this function.

Stakeholders generally agreed that the system gives good visibility on stock levels. However, a sustained reduction in stock-outs depends upon the active participation of decision makers. As a result, declining stakeholder participation presents a challenge to the sustainability of SMS for Life's objectives.

According to interviewees, three reasons could be behind falling stakeholder participation. Firstly, in some cases, staff turnover at facility and district levels means that new staff may not be informed about SMS for Life. Secondly, facility and district staff did not see an improvement in MSD stock distribution, thus reducing their incentive to use the system. Thirdly, Government participation was hampered as no resources were allocated specifically for this.

Finding 13: Financial challenges threaten the sustainability of SMS for Life

Health facility workers received TSH 1,000 (approximately USD 0.62) in phone credit each week for sending a stock level SMS. Maintaining a financial incentive to health facility workers increases costs and reduces financial sustainability in the long term. The financial incentive promotes responses by health facility staff, although several interviewees noted

that, in the long term, the system's effectiveness in reducing stock-outs should be incentive enough to participate. Interviewees also mentioned that providing an incentive as part of one reporting system (i.e. SMS for Life) can impact participation levels in systems without a financial incentive negatively.

While support for SMS for Life continues within the MOHSW, the Ministry currently has no funding to continue its involvement and is searching for new donors. As part of the MoU signed by all SMS for Life partners, the MOHSW committed to fund the program for three years after the scale-up. However, budget restrictions mean that this has not been possible to date. In response, the Government has included the system in its most recent grant application to the Global Fund. If approved, SMS for Life would be funded from the monitoring and evaluation component of that grant. Interviewees indicated that, if approved, this funding might be available by 1 April 2013 and for approximately three years. Interviewees further report that the MOHSW has confirmed that it will take over funding for SMS for Life from that date, either with Government funds or with the help of external donor funds.

Finding 14: Government ownership of SMS for Life has been limited to date

Partner and Government interviewees agree that the scale-up process of SMS for Life has been driven more by partners than by the Government. For example, the MOHSW was not present in scale-up planning meetings, and key governance and management events did not take place on time. According to interviewees, steering committee meetings were expected every few months. However, there have only been two such meetings between August 2010 and the end of 2012. The MOU signed by the Government and the partner organization does not clarify expectations in this area, making it difficult to ascertain the extent to which implementation was behind schedule.

Government interviewees further indicate that the MOHSW perceived its role as limited, for the reason that it did not receive project resources for NMCP and MOHSW to attend training sessions or to undertake follow-up work with DMOs. These stakeholders noted that this lack of resources especially limited MOHSW's ICT staff, which was originally meant to control access to system data and distribute user identifications and passwords. However, Government stakeholders reported that user identifications and passwords must be requested from the service provider (Matsoft), and that the data is managed and controlled by Vodafone. Similarly, the MOU assigns responsibility for follow-up fundraising to the Government; however, throughout 2012, it was unclear whether and how the Government would be able to meet this commitment.

The Government's limited ownership to date seems to be driven by a number of factors. Firstly, partners led the process from the start and advanced the agenda. Secondly, agreements were vague with regards to the exact design of SMS for Life and in terms of implementation responsibilities, resulting in varying and sometimes at-odds perspectives of how SMS for Life should be implemented and used. Lastly, when the absence of Government leadership became clear, partners stepped in to drive implementation and extend bridge funding, thus perpetuating the situation.

Government ownership is important to the sustainability of SMS for Life because the system benefits the activities of health facilities. Government ownership will increase SMS for Life's credibility with decision makers in districts, MOHSW, and MSD. It will allow Government staff to incorporate the system into their workflows, thereby encouraging regular engagement from DMOs and central Government and achieving better stock allocation and fewer stock-outs.

Finding 15: Programmatic challenges threaten the sustainability of SMS for Life

Duplicate functions and objectives between SMS for Life and the ILS Gateway system will challenge the sustainability of these systems. Currently, health facilities report similar data for both systems, and district and central Government stakeholders have access to data from both. This causes stakeholders to engage in iterative functions as they work across both systems. In the long term, such redundancy will reduce efficiency and undermine the sustainability of both systems.

5 Recommendations

Recommendation 1 (short-term): MSD staff should be trained to use SMS for Life.
As a way of immediately improving the system's functioning, we recommend that MSD staff be trained in its use, including how to enter zonal store data. Including MSD staff and zonal stores in SMS for Life would create transparency for participants in the supply chain at the central, zonal, and district level. It would improve understanding between districts and zonal stores, as DMOs are currently unable to see the stock levels at zonal stores, and MSD staff is unable to view stock levels in facilities and plan supply accordingly. At an operational level, MSD use of SMS for Life would enable zonal store staff to hold DMOs accountable for sending stock orders for all health facilities experiencing stock-outs.

Recommendation 2 (short-term): The MOHSW should assign a focal person to follow up with DMOs to ensure timely and accurate submission of stock orders to MSD.
When DMOs are accountable for ensuring facilities provide correct orders that are received by MSD zonal stores on time, deliveries are more likely to happen on time and at the required quantities. However, throughout the national scale-up, no one from MOHSW was assigned to make sure this happened. We recommend that someone be assigned to this role going forward, thus improving supply chain management, both planning and delivery.

Recommendation 3: The Government should initiate and lead a process to consolidate objectives, approaches, systems and donors.
Opportunities to improve the performance of SMS for Life are clear. The most notable opportunity is to integrate SMS for Life vertically, horizontally, and programmatically. Lastly, and importantly, it should be integrated into Government management and processes. Almost all interviewees suggested that greater Government ownership would be critical to a successful evolution of the system. Accordingly, a process to improve SMS for Life's performance should be initiated and led by the Government to ensure that any changes are credible and fit Government needs.

As discussed earlier in this report, the system's performance could be improved in a number of ways. We offer the following discussion points to prompt this dialogue.

Proposed agenda for multi-stakeholder dialogue investigating opportunities to consolidate national efforts to reducing stock-outs of anti-malarial drugs and other health commodities

Purpose: To facilitate discussion aiming to improve the relevance, effectiveness, efficiency and sustainability of health commodity supply chain management, with specific reference to SMS for Life, ILS Gateway, and anti-malarials.

Discussion point 1: Government ownership: Is there Government support to continue SMS for Life in its current format? If so, how can day-to-day management and ownership of SMS for Life be transferred to MOHSW?

Discussion point 2: Vertical integration: Would SMS for Life's vertical integration with upstream supply chain management processes contribute to reduced stock-outs? If so, how can SMS for Life integrate into existing supply chain planning and management processes at MSD and NMCP?

Discussion point 3: Horizontal integration: Do opportunities for horizontal integration exist (e.g., with ILS Gateway and eLMIS)?? If so, how would the activities and scope of each system change in the case of integration?

Discussion point 4: Programmatic efficiency: Would other health commodity programs benefit from being included in the portfolio of SMS for Life or an integrated system?

6 Conclusion

The pilot programme of SMS for Life proved it is possible to use a simple technology to improve the transparency of stock levels of essential malaria medicines and ultimately to reduce stock-outs of at the health facility level. National scale-up has unfortunately not yielded the same results. The evaluation shows that the technical platform works well, and that health facilities are able to provide stock information reliably. However, the national scale-up has also revealed the challenges of managing and integrating such a system at the national level.

SMS for Life has been successfully implemented as a technical tool, but supply chain outcomes of the national scale-up have not been as positive as the pilot. This may in part be related to the national ACT shortage that occurred at the same time as the national scale-up, or to the system's segregation from upstream supply chain management and other facility-level programs, which inhibits its utility in resolving supply bottlenecks effectively. In order to create lasting and sustainable impact, the Government needs to take decisions on how it will manage the pharmaceutical supply chain and what role SMS for Life should play.

7 Annexes

7.1 Terms of reference

TERMS OF REFERENCE
Evaluation of the National Scale-Up of SMS for Life Tanzania

BACKGROUND TO SMS FOR LIFE

SMS for Life is an initiative to harness everyday SMS-based technology to eliminate stock-outs and improve access to essential medicines in sub-Saharan Africa. The project brings weekly visibility to all ACT and quinine injectable stocks at the Health Facility level and display via internet, mobile phone and mapping technology. Reporting is provided on actual stock levels and out-of-stock situations.

The overall purpose of SMS for Life is to provide accurate and timely stock data transparency to support the elimination of malaria medicine stock-outs at the Health Facility level.

This shall serve as the core guidance for the evaluation. All parties involved in this process have an interest in improving malaria treatment, as well as monitoring and addressing the level of ACT stocks available to ensure appropriate case management. They have agreed to explore the additional benefits which the new technologies may bring to this process.

This project could potentially have far-reaching beneficial implications for existing health systems. Stock-outs of any number of essential health commodities could be monitored by this innovative process and enable timely tracking and management of supplies and their delivery to the communities where they are needed most.

An early project, from Sept 2009 – March 2010 showed strong results. As a result of the pilot, a national scale-up was undertaken to cover the additional 128 Districts in Tanzania, (approx. 5000 Health Facilities). An intermediate report in May 2011 indicated that while the technology functions, buy-in from the Ministry of Health & Social Welfare required strengthening.

PURPOSE OF THE EVALUATION

Given the significant potential impact of the system, and the important investments made by a number of partners, notably the Tanzanian Ministry of Health and Social Welfare, Medicines for Malaria Venture and the Swiss Development Cooperation, an evaluation of the national scale-up is being carried out to assess the benefits and impact of the SMS for Life system in Tanzania. This evaluation is commissioned by MMV and SDC, with MMV as the lead contact point.

The contracting party will carry out an evaluation of the national scale-up of SMS for Life, including a combination of desk research, data evaluation and Key Stakeholder interviews. The evaluation will seek to address two key issues: the success of the scale-up to national reporting, and the overall impact of SMS for Life on decreasing stock outs of AL and quinine.

The evaluation will therefore focus on the following five points:

Primary outcome

- Successful scale-up to national reporting of key indicators of AL and quinine stocks on a weekly basis by all health facilities (i.e., whether and how the commitment to roll out the SMS for Life programme to the remaining 128 districts of Tanzania was met)

Secondary outcomes

- Response rates of SMS reported facility-based data
- Impact of the SMS for Life stock information in reducing stock-outs of AL and quinine at health facilities in Tanzania, notably at peripheral facility level
- Impact of visibility of information on the availability of AL and quinine on pharmaceutical supply management at district or national level, including use of the system by different levels of the Ministry of Health and relevant external partners who support stock management
- Programme management process and sustainability, notably in relation to the commitments made by each party in the context of the Memorandum of Understanding
- Comparison of the SMS for Life national scale-up results with those of the pilot (i.e., generalizability of the pilot results to a national implementation process)

METHODOLOGY

The evaluator will propose a methodology for assessment, including the following aspects:

- Indicators to be measured
- Indicators and/or size effect used to determine success
- Data collection methods
- Analytical approaches

OUTPUT AND REPORTS

The evaluator will provide a final report summarizing the following information:
a) Background on ACT stock monitoring and stock-out rates prior to the implementation of SMS for Life in Tanzania and to the national scale-up of SMS for Life in Tanzania
b) Key findings of the evaluation, relating to:

- SMS for Life impact and results on stock-outs
- SMS for Life impact on redistribution of stocks or adapting stock requirements
- SMS for Life impact on reporting rates, responses rates to stock-out reports,
- impact of the data to improve national pharmaceutical supply management and
- correlation between data from existing systems versus SMS for Life data
- SMS for Life implementation and progress including support by key parties
- Other factors impacting on overall availability of anti-malarials and other essential
- medicines in Tanzania during the period of SMS for Life national scale-up

c) Alignment between or major gaps in perceptions among or between stakeholders
d) Recommendations for next steps
e) The Terms of Reference of the evaluation
f) Methodology of the evaluation and key indicators assessed
g) A list of the stakeholders interviewed, including their position, institution & contact details. The list of stakeholders shall be agreed in advance with MMV and SDC, and shall include the parties to the MOU, as well as external parties and users of the system.
h) A list of key documents accessed or referenced during interviews

TIMEFRAME

The evaluation will take place during December 2012 to March 2013, with a final report submitted by 31st March 2013.

FEES AND INVOICING

A fixed fee will be agreed for this evaluation, with a maximum of 35 days work. If travel to Tanzania is required, this will be in accordance with MMV travel policy. Flights shall be booked through MMV. MMV will reimburse the cost of hotel accommodation, local transport and meals in accordance with its travel policy. All other costs shall be at the charge of the contractor.

The invoice for this work shall be submitted by the contracting party within 30 days of approval by MMV and SDC of the final report.

For further information, please contact

Renia Coghlan, Director, Market Intelligence
Medicines for Malaria Venture
Email : coghlanr@mmv.org

7.2 Methodology

7.2.1 Evaluation questions

Outcomes:

Relevance	Were the intended outcomes of SMS for Life relevant to the need? • Was the availability of anti-malarials a challenge prior to the SMS for Life project? • Were the envisaged project outcomes (i.e., reduction in stock-outs) relevant? • Is the ability of health facilities to report stock levels important in malaria control? • Is the ability of district staff to reallocate anti-malarials important in malaria control? • Is the ability of central to allocate anti-malarials more efficiently important in malaria control? • Is Government ownership important for the success of the SMS for Life project?
Effectiveness	Did SMS for Life achieve its goals? • What was the level of stock-outs over time? How does this compare with pilot districts? What are the reasons for disparities between districts? • Did health facilities use the system? • Did health facilities report accurate data? • Did district staff use the system to redistribute drugs within districts? • Was system data used in other decision making processes? • Did central and district staff use the system improve quarterly replenishment and reduce overall stock-outs? • Did the Government take full ownership for SMS for Life?
Efficiency	Does SMS for Life represent good value? • How do outcomes compare with cost? • How do different stakeholders perceive the value of this process?
Sustainability	How sustainable are the outcomes of SMS for Life? • How sustainable have outcomes been in the first year of SMS for Life? • What is the evidence that outcomes can be sustained? • What are the challenges to sustainability?

Outputs:

Relevance	Were the outputs in SMS for Life relevant to achieving the stated outcomes? • Was the design of training workshops relevant to enable staff to use the system? • Was the design of the project management team appropriate to ensure successful coordination of SMS for Life? • Was an SMS program an appropriate and relevant way to provide information on stock levels?

Effectiveness	Were project outputs completed as planned? • Were all proposed trainings completed? • Was staff at facilities given training sufficient to perform SMS submissions accurately? • Was district staff given training sufficient to use system information to reallocate stocks? • Did IT systems operate as planned? • Did the project management team coordinate outputs as planned? • Did the project complete an effective handover to Government? • How did the outputs compare to those of the pilot? • How could the quality of outputs been improved?
Efficiency	Did SMS for Life outputs represent good value? • Were project outputs provided in good time? • How did outputs compare with cost? • How did these costs compare to other benchmarks (i.e., workshop costs, IT services etc.)?
Sustainability	How sustainable are the project outputs of the project? • What measures have been taken to ensure outputs will be provided in the long run?

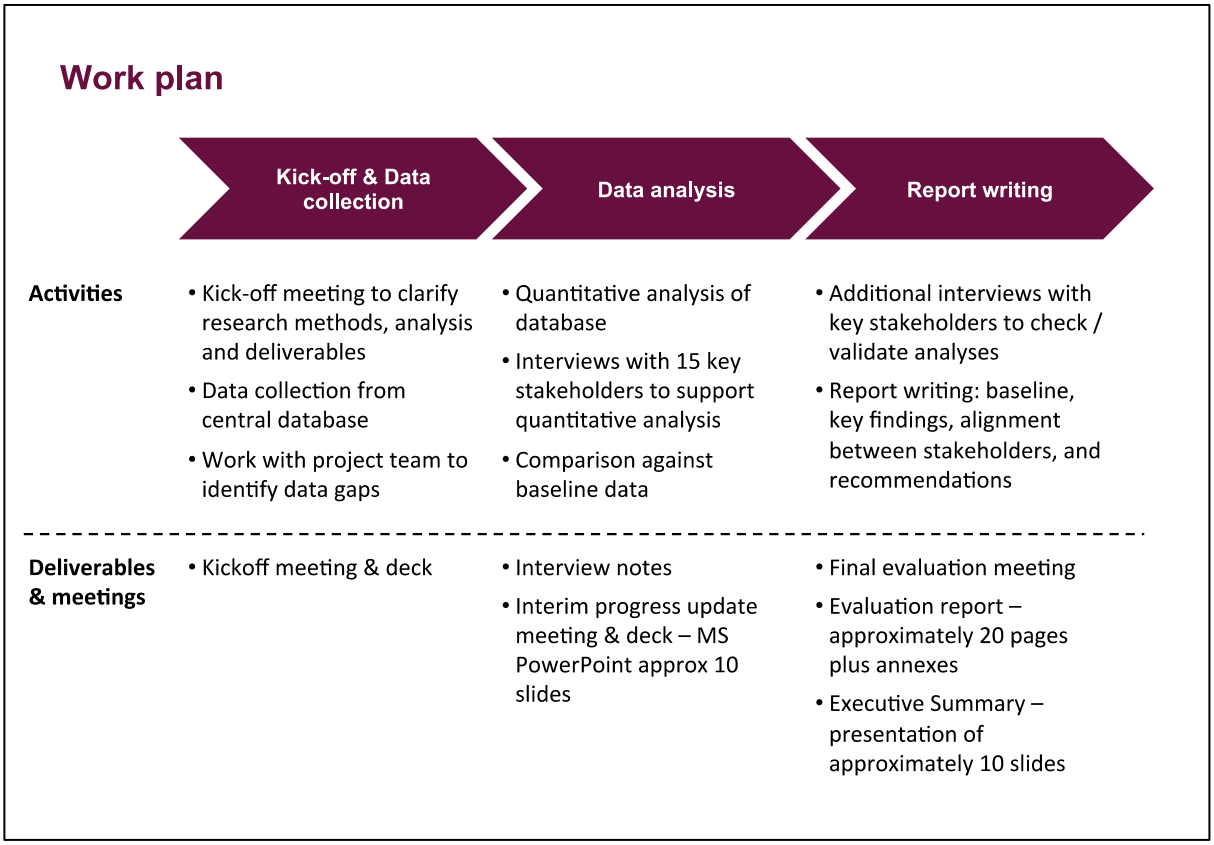
Inputs:

Relevance	Were project inputs relevant to achieving the desired outcomes? • Was the relevant staff made available and project planning put in place? • Did training materials cover topic relevant areas? • Was the type of telephone and IT equipment supplied suitable for providing and accessing information as requested?
Effectiveness	Was the quantity and quality of inputs sufficient? • Were all inputs provided as proposed and in a timely fashion? This includes equipment, personnel, funding, training materials, and the project plan.

Efficiency	**Did inputs to the SMS for Life project represent good value?** • **How much did training materials, phones, branding materials and personnel cost, and was this cost appropriate?**
Sustainability	How sustainable is the provision of project inputs? • Are resources secured to ensure training materials as other inputs are provided in the long-term? • What are the challenges to providing these inputs in the long-term?

7.2.2 Approach

This section describes the approach for creating the deliverables as specified in the TOR, in order to provide a clear and tangible impression of our vision for the evaluation. Based on our understanding of MMV's needs, we followed a three-phase approach to this evaluation:



Phase 1: Kick-off & Data collection

The first phase of the project aimed to collect all quantitative data and prepare the data for analysis in Phase 2. This phase lasted two weeks.

We downloaded all available information from the central database, covering all districts in Tanzania and approximately 5,000 health facilities. As is common with large datasets, it had gaps and some inconsistent data. Therefore, during Phase 1 we reviewed data to identify gaps and inconsistencies and worked with the project team to find solutions to any issues. By the end of Phase 1, we consolidated data in a form that can be easily manipulated.

We collected two types of data during this phase. Firstly, information by facility and district covered the volume of SMS requests, SMSs received, SMS response time, and stock levels by product type. This data provided information on a weekly basis from October 2009 (pilot inception) to November 2012 (or the most recent available).

Secondly, we collected usage data, which provided insight into how frequently users access the database. This covered all user groups including District Medical Officers, Regional Medical Offices, the National Medical Control Program, the Medical Stores Department, the project team, and any other users, including those within the Ministry of Health.

We ensured the data we collected covers the same data points as those measured during the evaluation of the pilot phase.

Milestone / Deliverable: Kick-off meeting and consolidated database

Phase 2: Data analysis

The second phase of the project analyzed the quantitative data collected in Phase 1. This phase supplemented and verified the previous analysis by collecting qualitative data and by building on insights from the baseline evaluation. This phase ran from week 2 to week 4.

The structure of the analysis was similar to that of the pilot program evaluation in order to enable comparison between the two reports. Phase 2 answered questions across three sections:

Analysis section	Key questions
Data requests and responses	• How simple is the system to use (response rates, response times, and error rates)? • What regional trends exist and why?
System usage	• How regularly do different users and regions access the system? • What is the relationship between usage and stock levels? • What issues encourage or prevent users accessing the system?
Stock level reports	• Has the introduction and scale-up of the system decreased stock-outs? • How could a redistribution of stocks help to alleviate the frequency of stock-outs? • What other factors could have affected the overall availability of anti-malarials during the scale-up period?

We performed quantitative analysis on the dataset created in Phase 1 to estimate key indicators (such as response rate and usage levels) and identify key trends. In cases where there were considerable differences across districts or regions, we performed multivariate regression analyses to help identify the significant drivers of these disparities. We used the expertise and experience of our practice area on complex quantitative analysis to perform additional analyses on the dataset, as required.

After the quantitative analyses, we conducted interviews with key stakeholders to validate our analysis and to refine our understanding of trends. We interviewed 28 stakeholders. These interviews helped answer additional questions:

- Do users' perceptions align with the data?
- How is the programme management process working? Does it need to be improved? Is it sustainable in the long run?
- What differences do stakeholders see in the national deployment of SMS for Life compared to the pilot phase?

We included individuals from all user groups in these interviews, as well as other external experts and specific individuals identified by MMV.

Across all areas of analysis, we compared data from the national scale-up phase to that from the baseline and pilot periods. As in the pilot program evaluation, the first week of data available constitutes the baseline. We did not visit facilities in order to verify accuracy of stock level submissions (as was the case in the pilot evaluation).

Milestone / Deliverable: Interim progress update meeting with slide deck (approximately ten MS PowerPoint slides), stakeholder interview notes.

Phase 3: Report writing

In Phase 3, we wrote the report (week 5 to week 7). This included time for further validation with stakeholders and a final progress update meeting, so that final adjustments could be made to the report before submission. The overarching structure of the final evaluation report was the following:

1. Executive Summary
2. Background and baseline
3. Key findings (including alignment and gaps among stakeholder perceptions)
4. Recommendations
5. Annexes
    i. ToR
    ii. Methodology
    iii. Stakeholders interviews
    iv. Key documents
    v. Additional analyses

In the report, we provided a comprehensive analysis of the performance of SMS for Life after scale-up and compare it to its pilot performance. We also drew broader implications from the pilot and scale-up at the strategic level. Examples questions include:

- What are the lessons learned in scale-up for other programs?
- What are the drivers of success of the program / the barriers it is facing?
- What are key success factors for replication in other environments?
- Which other applications would benefit from a similar approach? How would the approach need to be modified?

These lessons help MMV and its partners to maximize the value of SMS for Life beyond the project and help to inform the design of future interventions.

Milestone / Deliverable: Final progress update meeting, final evaluation report (approximately 20-30 pages plus annexes), final evaluation report executive summary (approximately 10 slides)

7.3 Stakeholders interviewed

	First Name	Surname	Title	Organisation	Country
1	Sarah	Saleheen	Consultant	Consultant	Kenya
2	Marasi	Mwencha	Deputy Country Director	JSI Tanzania	Tanzania
3	Nsaghurwe	Alpha	Director, MIS	JSI Tanzania	Tanzania
4	Dr	Kisala	DMO Igunga	MOHSW	Tanzania
5	Dr	Chinganga	DMO Namtumbo	MOHSW	Tanzania
6	Dr	Ikaji	DMO Nanyumbu	MOHSW	Tanzania
7	Winna	Shango	Head, Pharmaceutical Support Services	MOHSW	Tanzania
8	Hanif	Nazerali	Pharmaceuticals Advisor	MOHSW	Tanzania
9	Mercy	Mpatwa	Pharmaceuticals Technical Advisor	MOHSW	Tanzania
10	Beatus	Musoma	Health Program Manager	MSD	Tanzania
11	Ally	Mohammed	Manager, National Malaria Control Programme	NMCP	Tanzania
12	Fabrizio	Molteni	Health Advisor	NMCP	Tanzania
13	Rosie	Silaa	Health Advisor	NMCP	Tanzania
14	Jim	Barrington	Director, SMS for Life Project	Novartis	Switzerland
15	Daniel	Crapper	Executive Director	PSI Tanzania	Tanzania
16	Jan	Van Erps	Coordinator, PSM	RBM	Switzerland
17	Thomas	Teuscher	Deputy Director	RBM	Switzerland
18	Olivier	Praz	Deputy Head of Cooperation (Tanzania)	SDC	Tanzania
19	Elizeus	Kahigwa	Health Advisor	SDC	Tanzania
20	Jacques	Mader	Regional Health Advisor	SDC	Tanzania
21	Marcel	Tanner	Director	Swiss TPH	Switzerland
22	Don	de Savigny	Professor, Health Systems	Swiss TPH	Switzerland
23	Keith	Hummel	Commodities and Logistics Advisor	USAID Tanzania	Tanzania
24	Andrew	Rebold	Deputy Health Advisor	USAID Tanzania	Tanzania
25	Jon	Lee Davey	Solutions Manager	Vodafone	UK
26	Dianne	Sullivan	Global Head of R&D	Vodafone	UK
27	John	Murray	Business Development - mHealth Solutions	Vodafone Global Enterprises	UK
28	Peter	Breitenbach	Business Development Manager Africa	Vodafone Global Enterprises	South Africa

7.4 Key documents

7.4.1 List of key documents

The following is a list of all documents consulted during the evaluation:

- *Mapping Supply Chain Bottlenecks for ACTs in Tanzania,* May 2011, Sarah Saleheen
- *SMS for Life - Final National Training Report,* December 2011, PSI
- *SMS for Life Monthly Report,* March 2012
- *SMS for Life Strategy Planning Chronogram,* 15 March 2012
- *SMS for Life Strategy Planning Chronogram,* April 2012
- *SMS for Life Status Update,* 2 April 2012
- MMV letter to Mrs Regina Kikuli, Acting Permanent Secretary for Health, on subject of *SMS for Life transition*, dated 29th October 2012
- *Meeting on Transfer of Ownership of SMS for Life Tanzania to MoHSW,* Tuesday 4th December 2012, MMV

7.4.2 Memorandum of Understanding

Key roles and responsibilities defined in the MOU:

- MOHSW
    - Chair steering committee
    - Provide local project manager
    - Provide access to MSD, zones, regions, etc
    - Provide required data (addresses, etc)
    - Own and make SMS for Life part of the mainstream health system
    - Fund and keep system operational for at least 3 yrs after implementation
    - Provide 1st line ICT support to DMOs
- RBM
    - Provide advice and guidance to the project
    - Chair the project steering committee
- MMV
    - Provide funding to PSI for in-country costs of implementation
- Novartis
    - Provide 1 resource as project director
    - Training and project materials to PSI
    - Train PSI in all aspects
    - Train MOHSW, NMCP, and IT personnel
    - Coordinate partners
    - Provide funding to VGE in implementation
- PSI
    - Provide resources to train health facility workers
    - Provide training materials
    - Plan and execute the trainings
    - Allow Vodacom to associate brand with implementation
- Vodafone
    - Operate Vodafone relationship manager platform

    - Manage SMS communication in Tanzania
    - Provide full end-to-end systems operation and support at competitive price
- Vodacom
    - Provide 262 smart phones (2 per district)
    - 1 year of free data access for each of these phones
    - 6,000 health facility posters and t-shirts
    - Brand training materials and training facilities

7.5 Additional analyses

We conducted a number of additional analyses, which are included for reference in the following figures. The additional analysis is split into two groups. First it shows data at the national level. Second, it focuses just on those districts included in the pilot phase.

7.5.1 National level analysis

The national scale-up process began in February 2011, and by November 2011 all health facilities were trained in how to send data via SMS. For the purposes of this evaluation the data observation period therefore ran from November 2011 until November 2012 (when the evaluation began). The figures in this section of the document illustrate the following trends:

- **Approximately three quarters of all facilities were out of stock of all ACT dosage forms at some point.** Almost 1,250 health facilities were never completely stocked-out of ACTs, but all other suffered a total stock-out during the observation period.
- **Approximately three-quarters of all facilities experienced stock-outs of one or more ACT products for more than half of the observation period**. Around 150 health facilities were never out of stock of any ACT product, but around 500 facilities were always out of stock of at least one ACT product.
- **The total volume of ACTs in health facilities fluctuated over the observation period, but peaked three times at 148,000 treatments**. The total volume of ACTs in health facilities peaked at the beginning of the observation period at 148,000 treatments. However, it then decreased over the next five months to a low of 88,000 treatments in March 2012. Stock levels then increased back to 148,000 by June 2012. The level of stock then fluctuated between 110,000 and 148,000 for the remainder of the observations period.
- **The number of user log-ins peaked at the start of the observation period, and declined slowly throughout**. During the final week of November 2011, the SMS for Life web-based user interface received 45 user log-ins. Login frequency then declined over the year, and the number of log-ins was less than 20 per week for the vast majority of 2012. It is important to note that logging into the system is not the only way DMOs and other stakeholders can access information as all DMOs are sent a weekly email with a stock level summary for their respective district.

Figure 7.1: Frequency distribution of stock-outs of all ACT products

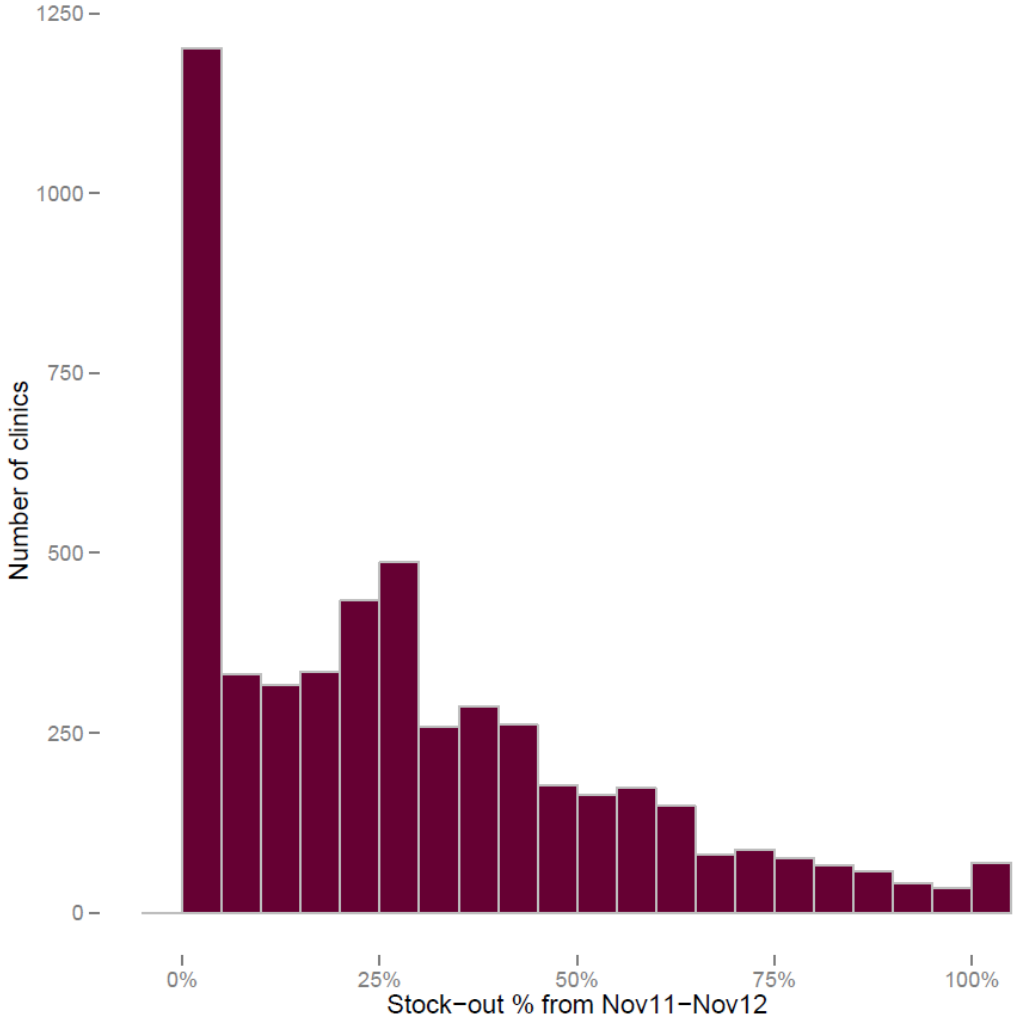


Figure 7.2: Frequency distribution of stock-outs of one or more ACT products

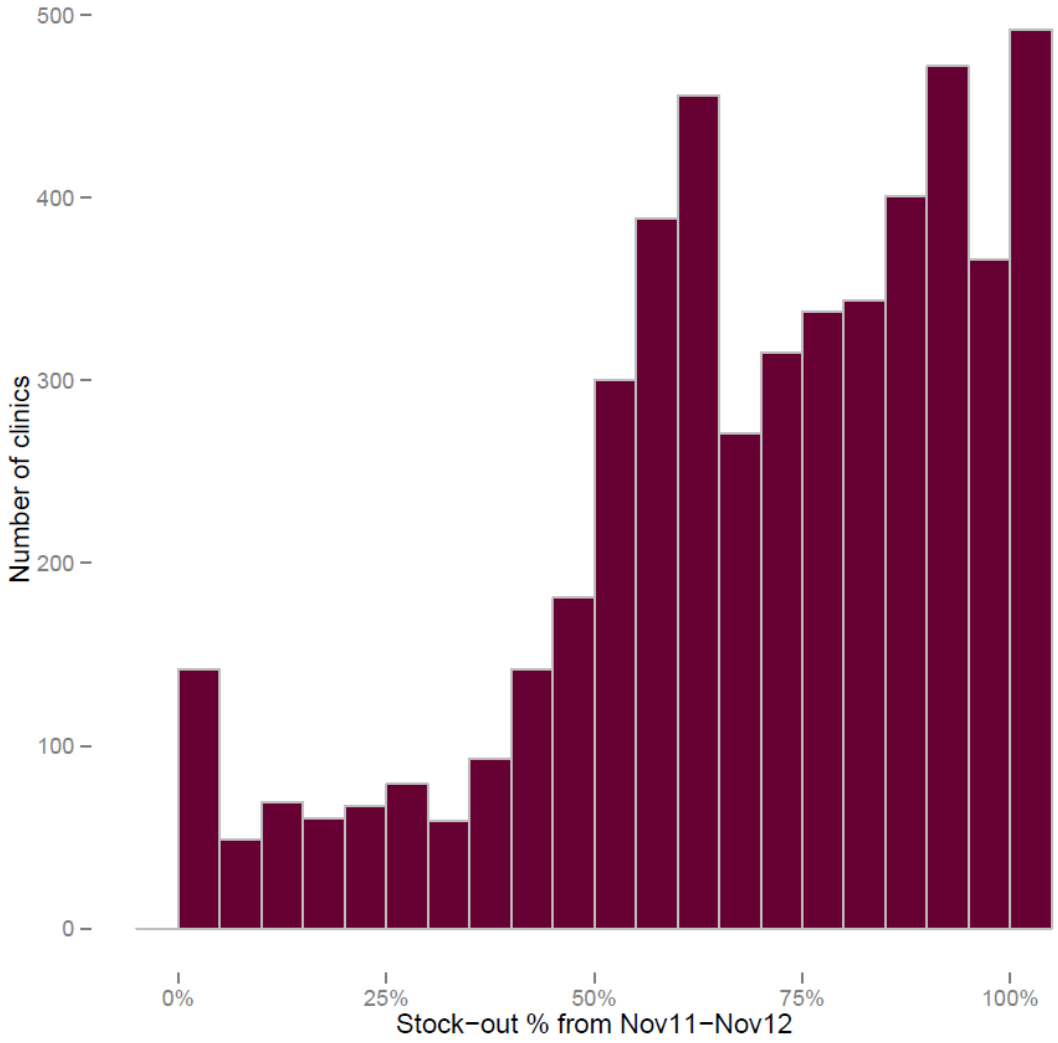


Figure 7.3: Frequency distribution of stock-outs of quinine

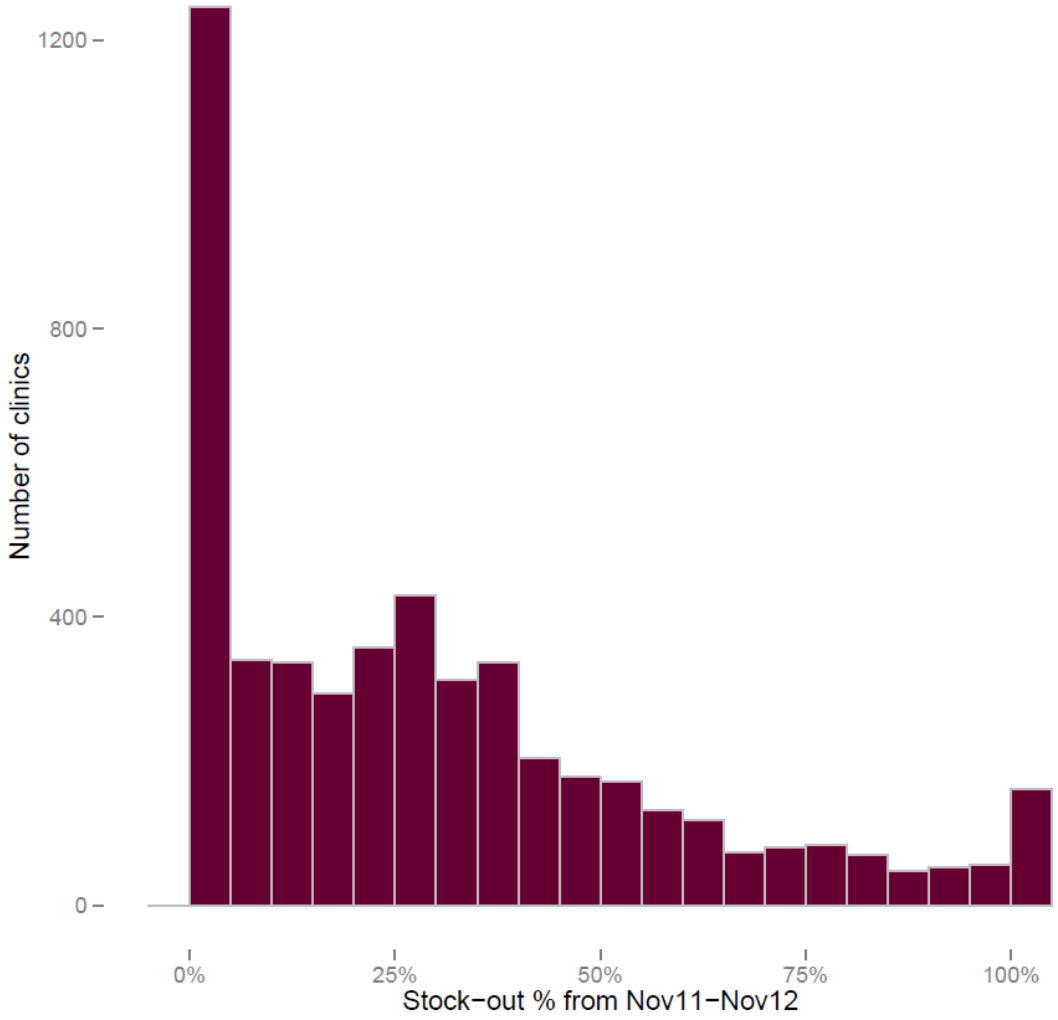
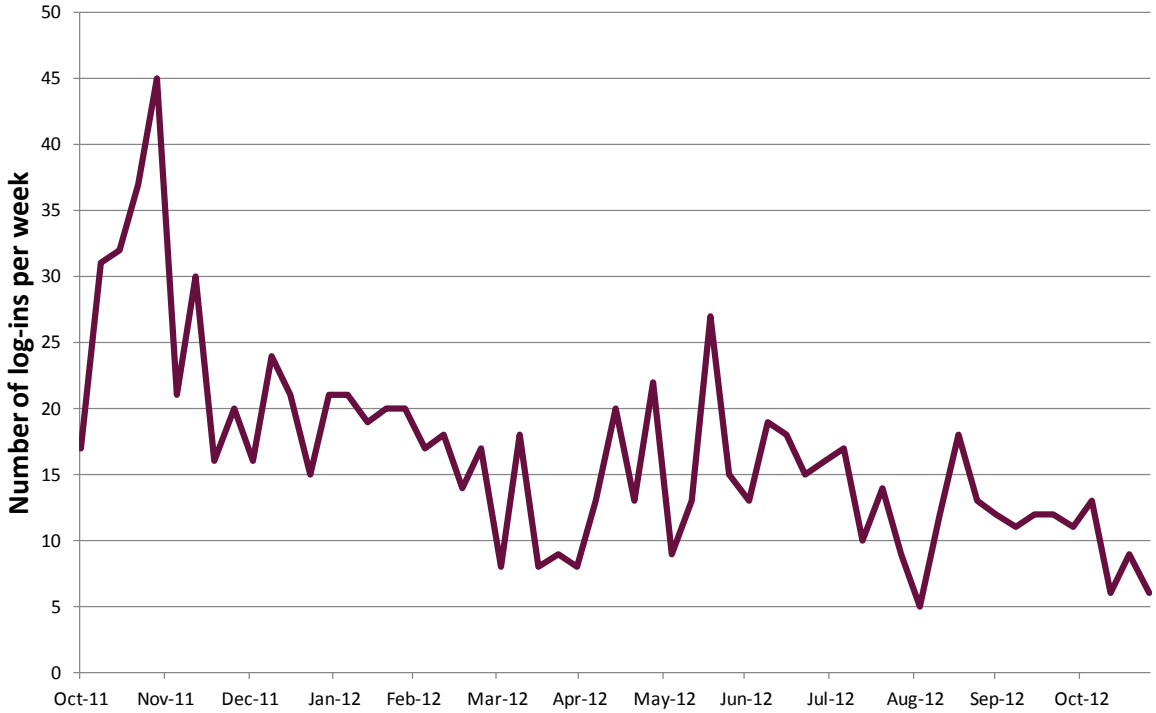


Figure 7.4: Total volume of ACTs in health facilities

Figure 7.5: User log-in frequency (excluding IT support staff)



7.5.2 Pilot district analysis

Three districts participated in the SMS for Life pilot phase between October 2009 and February 2010. Response rates were consistently above 90% and all three districts experienced a drop in stock-out rates. However, when looking at data for these three districts over the project period from October 2009 until January 2013, it can be seen that several trends have emerged:

- **Response rates have fallen in all districts**. During the pilot phase, response rates in Kigoma Rural, Lindi Rural, and Ulanga were 80%, 99%, and 93% respectively. Over the evaluation period (November 2011 until November 2012) response rates were 62%, 72%, and 50% respectively (see Figure 7.6).
- **The frequency of stock-outs has increased**. During the pilot phase, average ACT stock-out rates in Kigoma Rural, Lindi Rural, and Ulanga were 12%, 0%, and 14% respectively. Over the evaluation period, these increased to 41%, 24%, and 22% (see Figure 7.7).
- **ACT stock levels are lower**. During the pilot phase, the average total weekly stock level across all three districts was the equivalent of 9,680 treatments for infants of 5 to 15kg bodyweight ("infant equivalent treatments"). However, during the evaluation period, the total stock level was 2,546 infant equivalent treatments (see Figure 7.10).

Figure 7.6: Percentage of facilities in pilot districts sending stock data via SMS each week

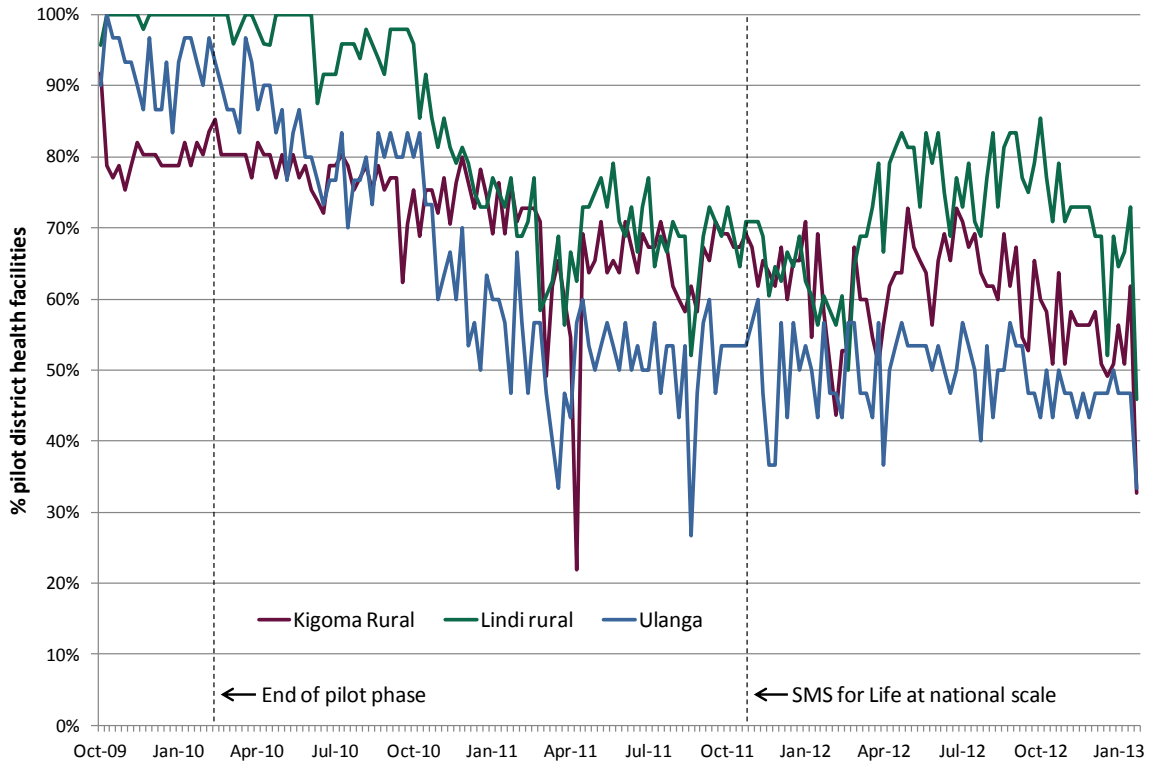


Figure 7.7: Percentage of facilities in pilot districts with stock-out of all ACTs

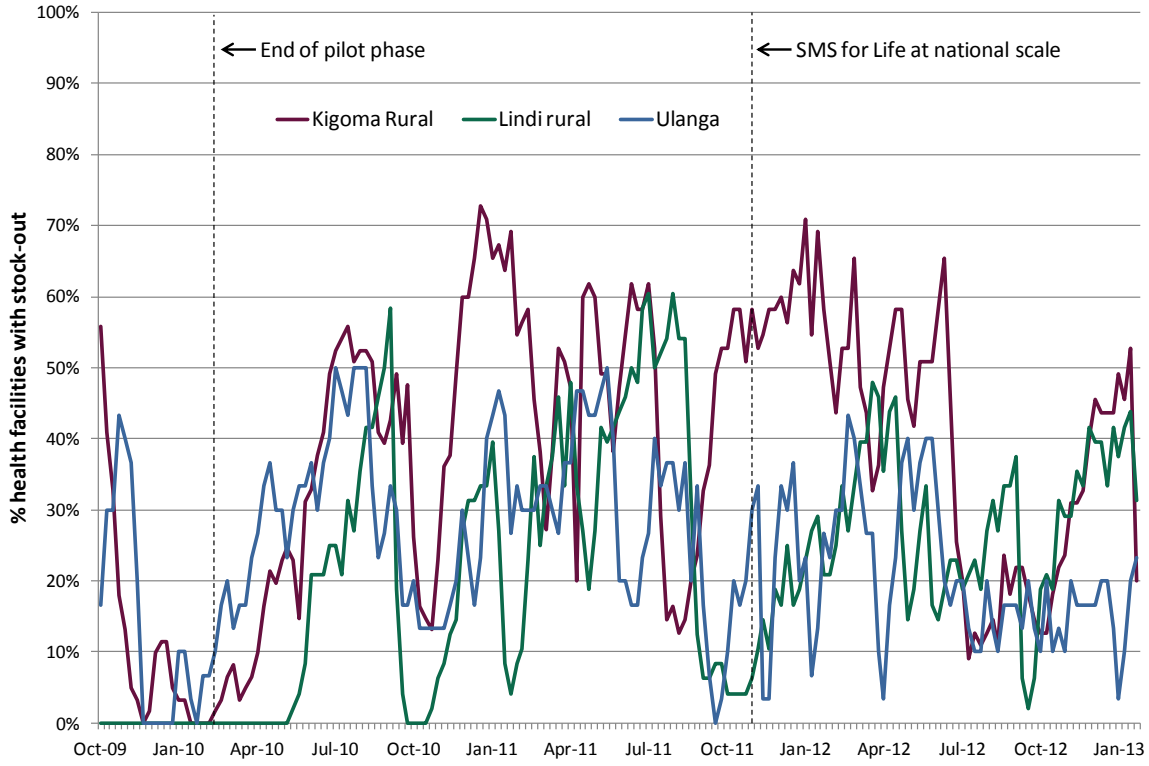


Figure 7.8: Percentage of facilities in pilot districts with stock-out of one or more ACTs

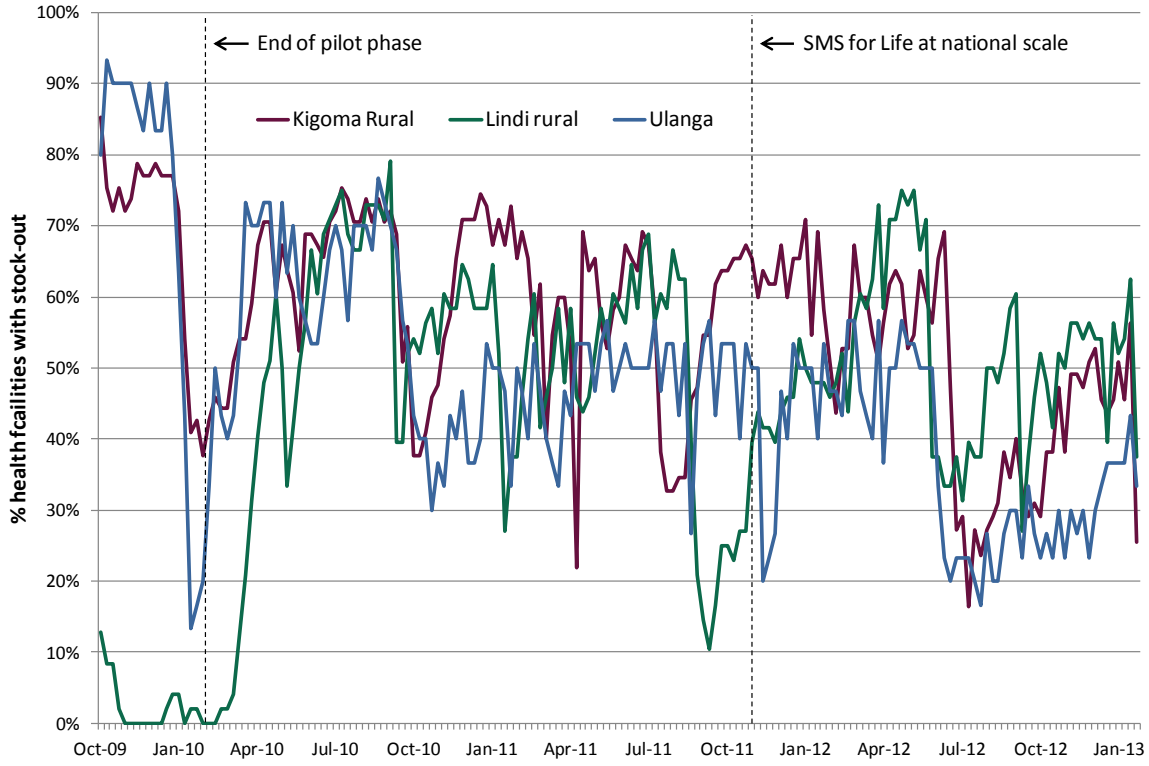


Figure 7.9: Percentage of facilities in pilot districts with stock-out of quinine

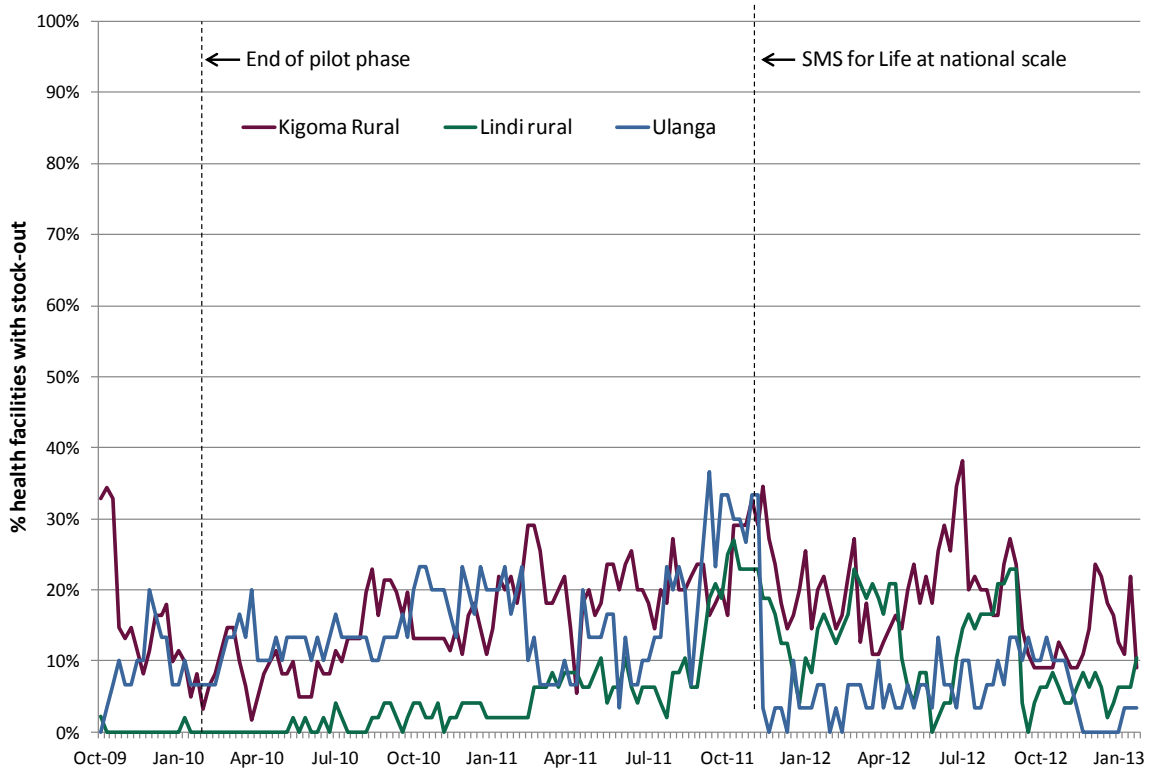


Figure 7.10: Total ACT stock level in pilot district health facilities