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TANZANIA: QUANTIFICATION AND SUPPLY PLANNING FOR ANTI-MALARIAL MEDICINES (2008)



PRESIDENT'S MALARIA INITIATIVE



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Abstract

In May of 2008 the USAID | DELIVER PROJECT provided technical assistance in quantifying anti-malarial medicines and diagnostics, and preparing procurement plans for select partners in Tanzania, including the National Malaria Control Programme, the Accredited Drug Dispensing Outlet (ADDO) program, and the United Nations High Commission for Refugees (UNHCR). The overall objective of this technical assistance is to ensure an adequate supply of antimalaria commodities managed by each program or partner by forecasting commodity needs from May 2008 – 2010 and preparing procurement plans for each commodity by program. This report presents the findings of this technical assistance activity.

USAID | DELIVER PROJECT

John Snow, Inc.
1616 Fort Myer Drive, 11th Floor
Arlington, VA 22209 USA
Phone: 703-528-7474
Fax: 703-528-7480
E-mail: askdeliver@jsi.com
Internet: deliver.jsi.com

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ACRONYMS

ACT	artemisinin-based combination therapy
ADDO	Accredited drug dispensing outlet
ALu	artemether-lumefantrine
FEFO	first-to-expire, first out
GF	Global Fund (GFATM)
GFATM	Global Fund to Fight AIDS, Tuberculosis and Malaria
GOT	Government of Tanzania
IPT(p)	Intermittent Preventative Treatment
JSI	John Snow, Inc.
LMIS	logistics management information system
MOHSW	Ministry of Health and Social Welfare
MOS	Months of stock
MSD	Medical Stores Department
MSH	Management Sciences for Health
NMCP	National Malaria Control Program
PMI	President's Malaria Initiative
PSU	Pharmaceutical Supplies Unit
SOH	Stock on hand
SP	Sulfadoxine-Pyrimethamine
STG	standard treatment guideline
TA	technical assistance
UNHCR	United Nation High Commission for Refugee
USAID	U.S. Agency for International Development
WHO	World Health Organization

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In addition, the authors recognize the generosity of the NMCP, PSU and MSD, donors and implementing partners, for giving their time to provide the information needed for the quantification.

A project of this scope involves contributions from so many people that it is impossible to acknowledge all of them, and we would surely unwittingly omit many if we attempted to do so. We are sincerely grateful for their in-depth and extensive assistance.

EXECUTIVE SUMMARY

Tanzania is a priority country of the President's Malaria Initiative (PMI) with approximately 93% of the population living in areas where malaria is transmitted. As a recipient of PMI funds, the USAID | DELIVER PROJECT's mandate in Tanzania is two-fold: 1) to provide technical assistance to management of anti-malaria commodities on the mainland and Zanzibar. This includes support to development of forecasts for anti-malarials and diagnostics and preparation of procurement plans and; 2) to procure anti-malaria commodities and diagnostics for the select programs on the mainland, the accredited drug dispensing outlet (ADDO) program, and the United Nations High Commission for Refugees (UNHCR), and procure diagnostics for Zanzibar.

In line with the first component of the project's mandate, a team of two USAID | DELIVER PROJECT staff traveled to Tanzania from April 11 – 25, 2008 to provide technical assistance to the National Malaria Control Program (NMCP) on the mainland¹ in quantifying and preparing procurement plans for the public sector commodities used to treat uncomplicated and severe malaria, provide intermittent preventative therapy (IPTp) for pregnant women, and rapid diagnostic tests (RDTs). As recipients of commodities funded by PMI and procured through the project, quantification and procurement plans were also prepared for the ADDOs and UNHCR where possible. Forecasting and quantifying need, and preparing appropriate procurement plans are essential steps in managing adequate stock levels and preventing stock-outs.

PURPOSE OF THE TECHNICAL ASSISTANCE

The overall objective of this technical assistance is to ensure an adequate supply of public sector antimalaria commodities managed by the National Malaria Control Program (NMCP) on Tanzania's mainland; UNCHR, and the ADDO program by forecasting commodity needs from May 2008 – 2010 and preparing procurement plans for each commodity by program.

This technical assistance report is divided into sections that address the forecasted commodity need for each of these programs and the respective procurement plans. This report also includes an overview of two forecast methodologies (logistics-based and morbidity) and the general approach undertaken while providing this technical assistance. This approach involves collecting and verifying as much data as possible via interviews with in-country partners and document review, the use of appropriate tools including Quantimed software to prepare the forecast and PipeLine software to prepare the procurement plans, as well as close collaboration with staff from the National Malaria Control Program to not only ensure that the forecast and procurement planning process is informed at every step but also to build local capacity in using the forecast and procurement planning tools.

RESULTS OF THE TECHNICAL ASSISTANCE

¹ Zanzibar's standard treatment guidelines differ from those on the mainland. As a result of time constraints, it was not possible for Zanzibar to be included in this quantification and procurement planning exercise.

The results of the quantification and procurement planning activity are summarized in the table below. A two year forecast was prepared for each commodity and program, and where applicable, a one-year procurement plan was developed. For all programs, consumption should be closely monitored, and the forecasts and corresponding procurement plans updated on a semi-annual basis at the very least.

To complete the public sector quantification for anti-malaria commodities, the project jointly conducted preparation of a forecast and procurement plan for sulfadoxine-pyrimethamine (SP), artemether-lumefantrine (ALu), and quinine tablets and injections, with the Pharmaceutical Logistics Coordinator from the Pharmaceutical Supplies Unit (PSU) housed within NMCP. At the request of the NMCP Program Manager, anti-convulsants (Phenobarbitone and Diazepam) used in managing severe malaria were also included as part of the quantification and procurement planning. 20 million episodes were agreed as the basis for forecasting first –line treatment need.

A forecast for RDTs consumption in three regions (Iringa, Kagera, and Dar) was prepared. These are the first three regions where RDTs will be used with anticipated funding from the Global Fund Round 7 grant. Nation-wide roll-out of RDTs will follow in a phased plan over the life of the grant. At the time of the technical assistance visit the funding had not been allocated so a procurement plan for RDTs will be prepared at a later date.

Table 1: Summary of results

Program	Product	Forecast	Procurement Plan
Public Sector	ALu	20 million episodes per year	Completed
	Quinine tablets and injections	3.5% conversion factor	Completed
	Sulfadoxine-Pyrimethamine	Expected consumption of IPTp1 is 80% and IPTp 2 is 50% for all pregnancies	Stock on Hand (SOH) sufficient beyond forecast period
	Phenobarbitone and Diazepam	Complements needs for severe malaria treatment	Completed
	Rapid Diagnostic Tests (RDTs)	Roll-out to three regions in the first year. A second year forecast was not prepared.	Global Fund Round 7 grant not yet awarded; prepare procurement plan at a later date
ADDO Program	ALu	Based on current sales to existing ADDOs. The forecast will need to be adjusted as more ADDOs come on line with funding from Global Fund Round 7 and efforts encourage consumption	SOH sufficient beyond forecast period; Transfer to UNHCR to avoid expiries
UNHCR	ALu	Assumed an estimated scale down rate of refugee population	Receive transfer of ALu from the ADDO program before planning procurement
	Rapid Diagnostic Tests (RDTs)	Assumed an estimated scale down rate of refugee population	SOH sufficient during forecast period

For the ADDO program, data was made available from Management Sciences for Health (MSH), a project that provides technical assistance to rolling-out the ADDO program, and Pyramid Pharma, a private warehouse that stores and manages ALu distribution for this program. From UNHCR, detailed information on current and expected camp population, and ALu and RDT consumption, was provided by the camp's Associate Medical Officer.

Depending on the data available and the program plans, the two forecast methodologies, logistics-based and morbidity, were adopted for each program to complete the forecast. Challenges were encountered with each program while preparing the forecasts and procurement plans. Data quality and availability are of varying levels for each program's average consumption. For the public sector, there were inconsistencies on current stock status and substitution of one weight band for the other skews consumption data. At the time of the quantification, funds from Phase 2 from the Global Fund Round 4 for procurement of ALu were pending. Until this situation is resolved, procurement processes continue to be delayed. Also, lengthy procurement processes for other products hampers the continuous availability of medicines when needed.

For the ADDO program, consumption has been much lower than anticipated and there is the risk of expiry of the current stock on hand. For UNHCR, population levels are expected to decline by almost 50% by December 2008 however this is uncertain because the factors that influence repatriation are difficult to predict.

RECOMMENDATIONS

Recommendations for each program are as follows:

PUBLIC SECTOR:

- The PipeLine databases were developed using forecasted consumption figures. These should be updated regularly with actual consumption data from the facilities. This would enable orders to be adjusted as needed taking into consideration the rate of consumption of the products in country. This process ensures that the stock is managed appropriately thus minimizing the risk of overstocking /under stocking.
- It is recommended that at a minimum, the quantification is reviewed and revised every six months taking into consideration the possible changes in the variables that were used in the present quantification activity.
- There is the need to improve data availability through district reports and regular supervision. This would ensure that data used in the quantification is a true representation of the consumption trends in the health facilities.
- Distribution of antimalarials to the health facilities should be based on the consumption pattern of these products at the health facilities. This would ensure that there is no stock-piling of products that are not being used at the level of the health facilities while there may be other facilities in need of these products. The transition from the current push system to a pull system for ALu should therefore be encouraged and undertaken as soon as possible.

- Greater emphasis should be placed in tracking procurements and stock data in the MSD supply pipeline. This can be achieved by conducting physical counts of the stock of antimalarials quarterly and adjusting procurement accordingly.
- The establishment of quarterly meetings for partners to review antimalarial and RDT stock status is recommended. These meetings would provide a forum for a wide range of partners including NMCP, donors, MSD, and implementing partners to monitor trends in consumption of antimalarial commodities in light of expanding efforts to lower malaria incidence.
- There is the need to extend capacity-building activities to other in-country partners. During this visit, the PSU/NMCP Pharmaceutical Logistics Coordinator was introduced to the use of Quantimed and Pipeline software in forecasting antimalarials. It is recommended that MSD staff be trained on the use of Pipeline to help them properly manage and track shipments and develop appropriate procurement plans.
- As efforts to make ALu more affordable and accessible are expanded to the private sector under the ADDO program with funding provided by the Global Fund Round 7, the potential shift of ALu consumption from the public to private sector should be monitored. The findings should be used to adjust the supply pipeline accordingly.
- Procurement lead times need to be shortened. Suggested means to do this include increasing the ceiling for emergency procurement and the Public Procurement Regulatory Authority (PPRA) could also grant a process waiver to MSD to enable them to cut down on the procurement lead time to ensure continuous supply of products as and when needed.
- Initiate procurement of Diazepam and Phenobarbitone as soon as possible. Given the long lead times discussed above, it is essential that processes for procurement of Diazepam and Phenobarbitone are initiated as soon as possible.

For the ADDOs:

- The rate of consumption is very low and there is the risk of expiry. Measures should thus be adopted to ensure that these medicines are redistributed to other areas in need of ALu especially the UNHCR Program.
- Increased effort should be made in educating the population on the availability of ALu in the ADDOs at subsidized prices to increase rate of uptake.

For UNHCR:

- As discussed above, the scale down rate of the population is uncertain and this uncertainty translates into product availability. This situation should be closely watched to ensure that the camps do not stock out of antimalarials. In the case of low stocks of ALu, more stock can be accessed from the ADDO program.
- UNHCR's RDT stock is expected to last until February of 2010. Since there is no dedicated PMI funding for RDT procurement in FY08, it is recommended that Tanzania's FY09 MOP include funding for RDT procurement. It is difficult to forecast beyond a two-year period, especially given the unpredictability of the refugee population, however if consumption trends continue, approximately 175,000 RDTs will be needed for the remainder of 2010. Suggested funding levels

and estimated quantities will be informed by the next annual quantification, to be completed in April of 2009.

BACKGROUND

Malaria is still a major public health problem in the United Republic of Tanzania, as the leading cause of outpatient and inpatient health service attendance and the leading cause of death in both children and adults. Tanzania is in the process of finalizing a five-year National Malaria Medium-Term Strategic Plan (NMMTSP) for 2008 – 2012. The strategy's overall goal is to reduce the burden of Malaria by 80% by the end of 2012 from current levels through four main approaches:

- Malaria Case Management
- Malaria in Pregnancy
- Integrated Malaria Vector Control
- Malaria Epidemic Prevention and Control

For the effective implementation, the core strategic approaches are supported by three more strategies that include:

- Implementation of IEC and Mass communication
- Operation research
- Monitoring and Evaluation

In 2006, Tanzania's standard treatment guidelines for malaria were revised to recommend artemisinin-based combination therapy (ACTs), specifically artemether-lumefantrine (ALu), as the standard treatment for uncomplicated malaria for all ages and pregnancies after the first trimester. ALu replaced sulfadoxine/pyrimethamine (SP) as the recommended first line treatment for uncomplicated malaria because of treatment failure due to increased parasite resistance to SP. Quinine is recommended as treatment for severe malaria, as second line treatment in the case of treatment failure or contraindication to ALu. It is also recommended for treating children that weigh less than 5 kilograms (kg), and treating pregnancies in the first trimester. Two doses of SP are recommended as Intermittent Preventative Treatment (IPTp) in pregnancy. The following table presents Tanzania's standard treatment guidelines.

Table 2: Tanzania’s National Standard Treatment Guidelines

Condition	Treatment Regimen
Uncomplicated Malaria (first-line)	Oral artemether-lumefantrine (ALu) 20/120 mg: for three days at 0, 8, 24, 36, 48, and 60 hours.
Uncomplicated Malaria (second line)	Quinine should be given for 7 – 10 days at a does of 10 mg/kg every 8 hours.
Severe Malaria (children and adults)	<p>Quinine should be given for 7 – 10 days at a does of 10 mg/kg every 8 hours.</p> <p>Once oral treatment can be tolerated, quinine tablets should be continued to complete a 7 days treatment OR a full course of ALu may be administered to complete treatment. (ALu should not be used to treat pregnant women during the first trimester or children under 5 kg.)</p>
Convulsions in Severe Malaria	Diazepam: Dose of 0.5 – 1.0 mg/kg. IV for adults. Rectal route for children. If convulsions persist for more than 10 minutes repeat rectal diazepam treatment. If convulsions persist after a second dose, give another dose of Diazepam or phenobarbitone 20mg/kg IM or IV after another 10 minutes
	Phenobarbitone: Use 20mg/kg IM or IV. Use for infants below 1 month of age. If convulsions persist, repeat phenobarbitone 10mg/kg after 30 minutes.
Malaria in Pregnancy (uncomplicated)	First trimester: Quinine Second and third trimesters: ALu
Malaria in Pregnancy (complicated)	Same as other adults (quinine)
Malaria in Children under 5 kg	Quinine should be given for 7 – 10 days at a does of 10 mg/kg every 8 hours.
Intermittent Preventative Treatment in Pregnancy (IPTp)	3 Sulfadoxine-Pyrimethamine (SP) tablets (500MG+25MG/tab). First dose administered between 20 – 24 weeks of gestational age and the second dose should be administered at 28 – 32 weeks.

SCOPE OF THE TECHNICAL ASSISTANCE

OBJECTIVES

The overall objective of this technical assistance was to ensure an adequate supply of anti-malaria commodities managed by the National Malaria Control Program on Tanzania’s mainland; UNCHR, and the ADDO program by forecasting commodity needs and preparing procurement plans for each commodity by program. Table 3 presents the products reviewed for each program, as well as sources of funding and the procurement agent.

Table 3: Programs and Products Reviewed

Program	Product	Procurement Agent	Funding
Public Sector	ALu	MSD	Global Fund Round 4
	Quinine tablets and injections	MSD	MSD revolving drug fund
	Sulfadoxine-Pyrimethamine	MSD	MSD revolving drug fund
	Phenobarbitone and Diazepam	MSD	MSD revolving drug fund
	Rapid Diagnostic Tests (RDTs)	MSD	GF Round 7 (pending)
ADDO Program	ALu	USAID DELIVER PROJECT	PMI
UNHCR	ALu	USAID DELIVER PROJECT	PMI
	Rapid Diagnostic Tests (RDTs)	USAID DELIVER PROJECT	PMI

To meet this objective, this technical assistance activity involved the following activities:

- Forecasting national and programmatic needs for all treatment regimens (first, second and, severe) and for RDTs for the public sector.
- Forecasting programmatic needs for the ADDO program (ALu) and for UNHCR (RDTs).
- Interviewing key informants about expected program results and patterns of consumption

- Reviewing methodology and results of existing malaria quantifications
- Obtaining information on procurement and donor plans and commitments
- Collecting and reviewing stock status data
- Conducting a physical inventory at MSD
- Inputting data into to Quantimed to forecast commodity quantities; import into PipeLine to plan commodity shipments
- Reviewing forecast results and procurement planning with stakeholders
- Finalizing forecast results and procurement plans in collaboration with stakeholders

For this quantification and procurement exercise, three programs targeting specific populations and with separate procurement and distribution channels were reviewed. These include the distribution of anti-malarial treatment and diagnostics for the public sector, ALu for the ADDO program, and RDTs and ALu for UNHCR. Each program's forecast results and procurement plans are described in detail in sections of this report.

REVIEW OF FORECASTING METHODOLOGIES

In general, the methodology selected for forecasting the future demand for services and commodity needs is based on the availability and quality of data on the rate of consumption of drugs or commodities used, as well as the different conditions to be treated. The forecasting methodology also focuses on program policies and program expansion plans. For the quantification of antimalarial commodities, a number of methodologies were considered and the data requirements analyzed. Based on this analysis, the team agreed on a methodology that would produce the most realistic results. The methodologies considered included the logistics-based methodology (consumption-based), and the morbidity-based methodology. The following narrative provides a brief discussion of the different types of methodologies.

LOGISTICS-BASED METHODOLOGY

The logistics-based methodology uses logistics data on consumption of commodities in the past as a basis for projecting future needs. Estimates of increases or other changes in consumption for each product during the period of the forecast are based on past trends in consumption, or product usage. The use of this method requires the availability of data on the quantities of drugs actually dispensed to patients at service delivery points over a specified period of time. Because consumption must be as accurate as possible, data on quantities dispensed directly to patients are highly preferred over issues data, which reflect quantities distributed from a higher level in the system to a lower level.

The logistics data required include quantities of drugs dispensed to patients, the stock on hand, and data on losses and adjustments. Information on the stock on hand and the losses and adjustments at the central level are also required to provide the full glimpse of the in country inventory status.

MORBIDITY-BASED METHODOLOGY

When using a morbidity-based forecast, projections and estimates are made by using morbidity or occurrence of a disease, patient targets, and service statistics. This method involves estimating the number of patients expected to be on treatment and the number of visits or treatment episodes to be encountered during the period of the forecast. This method requires the availability and use of standard treatment guidelines (STG) which must be adhered to by all service providers.

For the case of antimalarials, the morbidity-based methodology depends on the availability of information on the number of episodes of the disease that were reported for the forecast period and the treatment regimens that were applied.

The methodology adopted for each program was based on the data available and the program plans.

GENERAL METHODOLOGY

1. Extensive collaboration with in country counterparts and capacity building

One of the strategies adopted in building in-country capacity is the collaboration with in-country counterparts. For this activity, the PSU's Pharmaceutical Services Coordinator who spends the majority of his time at NMCP was a member of the quantification team. He brought a lot of programmatic experiences and pharmaceutical management experience to the team. This facilitated the data collection, verification, validation and analysis process to ensure that the parameters used in the quantification process were based on informed assumptions.

The team members worked together on the various steps in the process including, data collection from field visits; data analysis and validation; discussing and agreeing on forecast assumptions and forecast preparation including data entry; and procurement planning.

2. Interviews and consultative meetings with program officials and implementing partners

The team had extensive meetings with program officials and other implementing partners in a bid to gather the appropriate data needed for the quantification, and also to verify and validate some of the data collected. Interviews with in-country partners were conducted to learn program parameters and future needs for anti-malaria treatment

This process also enabled the team to document program plans including timelines to ensure that this are factored into the considerations for the forecast.

A list of officials and organizations consulted for this activity is attached in the Annex 3

3. Review of policy and technical documents and reports

A key part of the process was also the review of policy and technical documents to familiarize the team with recommended treatment guidelines and previous activities that had been carried that could impact the quantification and also to assess information on other major policy decisions that may affect the activity.

Technical reports and documents were reviewed and data from a number of sources including NMCP's monitoring and supervision reports, district malaria reports, and other service statistics were analyzed to verify consumption of anti-malaria commodities.

4. Visit to MSD and Pyramid Pharma warehouses to discuss management of malaria medicines

As part of the data collection process, the team visited MSD in Dar es Salaam to obtain information on the management of antimalarials. In the process, the team collected data on previous procurements, quantities distributed to the facilities and the stock on hand as at the end of the month of March 2008. The team later obtained updated information at the end of April 2008.

During the discussion, MSD raised some pressing issues that needed to be addressed including the length of time for normal international procurements. Also, as MSD decentralizes and more zones become responsible for storing pharmaceuticals, and filling and distributing orders, adequate storage space and room for packing lines are a concern. :

The team also visited the Pyramid Pharma warehouse where the ACT's for the ADDO program are stored and distributed. During the visit, the team had the opportunity to carry out a physical inventory to determine the stock on hand as at the day of the visit.

5. Use of Quantimed software to forecast malaria medicines requirements

In carrying out the forecast, the team used the software Quantimed developed by MSH. The Quantimed software program is a tool designed to facilitate the process of determining the quantities of medicines and related supplies required for a health program. In order to ensure that the process was carried out effectively, the Pharmaceutical Services Coordinator was introduced to the various components of the software and the software's capability.

These included

- Getting started with Quantimed including key features, instructions for navigating the software and defining Quantimed's data requirements
- Defining quantification data set parameters
- Data entry for the morbidity-based quantification method including entry of regimens and medicines per regimen
- Using the scaling up function which provides room for phasing in of patients
- Displaying results and analyzing data to come up with the forecast needs
- Generating queries from data and output reports

6. Use of Pipeline software to plan shipments and procurement quantities

For supply planning the team used the PipeLine software, a Deliver-developed procurement planning tool

As with the Quantimed software mentioned above, PSU's Pharmaceutical Services Coordinator was also introduced to the various components of the PipeLine software and the software's capability.

These included:

- Entering forecasted consumption data and adjusting stock status to recent physical inventory counts (by product)
- Monitoring of stock balances in terms of quantities and months of stock on hand in the entire program
- Comparing stock balances to maximum and minimum stock levels as designated by the program
- Identifying pipeline problems including stock outs, balances below minimum or above maximum

- Calculate shortfalls/surpluses, and the quantities required to maintain the program's desired stock levels
- Calculate and track pending pipeline actions such as when to plan, order, ship and receive products based on lead times, so as to ensure uninterrupted supply of products

FINDINGS BY PROGRAM

I. PUBLIC SECTOR PROGRAM

BACKGROUND

In the public sector, there are three different logistics systems to distribute pharmaceuticals and supplies to service delivery points. These include the kit system, currently operating in 3 of the 21 regions on the mainland, and the indent and integrated logistics systems (ILS) operating in the remaining regions, 9 regions per system. In the kit regions, MSD distributes uniform kits of essential drugs and other pharmaceuticals, including all anti-malarial drugs, with the exception of ALu, which is pushed out separately on a bimonthly basis. It is expected that the last three kit regions will be trained in the ILS before the end of 2008.

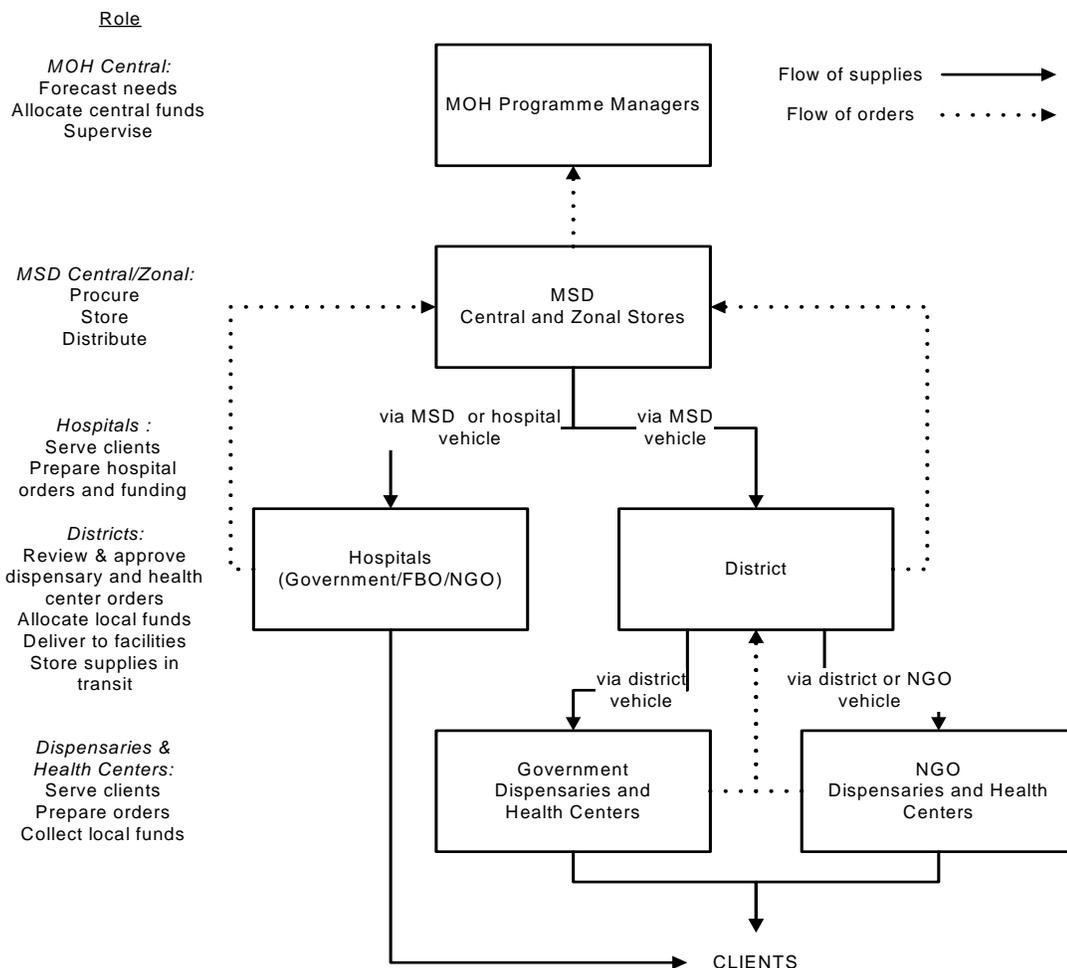
In the indent and ILS regions, ordering and distribution systems are similar except that in the ILS vertical program commodities are included on the same R&R as essential drugs. For both systems, each district is divided into three sections (A, B, and C). Each section orders and is resupplied on a quarterly basis, but staggered so that one third of the facilities orders any given month. Orders are submitted to the district level which are then compiled (not aggregated) and sent to the central level. MSD delivers to the districts each month and the districts are responsible for delivery to the service delivery points. The division of the districts into A, B, and C sections facilitates delivery from the district level to the facility level by concentrating scheduled deliveries in just one geographic area each month. See Figure 1 below for a diagram of the information and supply flow in the ILS and indent regions.

As a new product, ALu is not yet integrated into the R&R forms used by the ILS or the order forms used in the indent system. Nor is it included in the essential drug kits. Only hospitals submit ALu orders to the MSD zonal stores when needed. All other facilities receive ALu in kits of 330 treatments with weight bands divided into a 4/2/1/4 ratio. The yellow (1x6) and green (4x6) weight bands account for the larger proportions. Table 3 below shows the weight band composition of the different colored blisters.

Table 4: ALu Weight Bands

ALu Yellow (1x6)	5kg to 15 kg	120 treatments per kit (4 dispensers of 30)
ALu Blue (2X6)	15 kg to 25 kg	60 treatments per kit (2 dispensers of 30)
ALu Pink (3X6)	25 kg to 35 kg	30 treatments per kit (1 dispenser of 30)
ALu Green (4x6)	35 kg and above	120 treatments per kit (4 dispensers of 30)

Figure 1: Flow of commodities and information in the ILS and indent systems



In April of 2008, Dodoma became the first region to transition from a push to a pull system by placing orders for ALu along with all other commodities listed on the ILS R&R form. Lessons from this transition will be used to support conversion of all indent and ILS regions from the push to the pull system for ALu. The plan is for this to happen before the end of 2008.

Quinine, SP, and the anti-convulsants are listed on the regular ILS R&R and indent order forms. Recent data collected by PSU from 116 facilities in 16 regions using a supportive supervision tool shows that maintaining adequate stock levels of SP and quinine have been problematic at all levels of the system. To address SP shortages, a one-time push of approx. 2 million tablets has been planned. These tablets will be delivered to facilities in the ILS and indent regions, since the SP contained in the essential drug kits is more than enough to cover IPT needs in those regions.

Under Round 4 of the Global Fund, Tanzania was awarded funding to expand introduction of ALu into the public sector. Currently, the grant is in the process of being awarded Phase 2. In contrast to a

20,000 TZ shilling price of ALu in the private sector, ALu is offered at public health facilities at a subsidized cost recovery price of 300 TZ shillings for the yellow (1x6) and blue (2x6) presentations while the pink (3x6) and green (4x6) presentations cost 500 TZ shillings each. ALu can also be offered for free if the service delivery provider determines the client is unable to pay.

Funds for procurement of Quinine for treatment of severe malaria and SP for IPTp come out of the Medical Stores Department (MSD)² revolving drug fund.

For RDTs, Tanzania is expecting to receive funding under Round 7 of the Global Fund to procure RDTs for use in the public sector. These diagnostics devices are being used in just a few districts now. In the first year of the grant, RDTs will be rolled-out to three regions including Kagera, Iringa, and Dar. Testing protocols are not yet finalized.

FORECAST METHODOLOGY

In selecting the methodology to use for this quantification, a number of issues were analyzed including the review of both programmatic and technical issues which could affect the quantification. For this particular quantification, the quantification team adopted to use a mix of morbidity-based methodology and a logistics-based methodology. The decision was made following the collection, analysis, and verification of both morbidity and consumption data. The consumption data was assessed through the district malaria reports which capture aggregated cases of malaria seen at the public health facilities in the various districts during the period 2006-2007, as well as quantities issued. Although reports from the districts were available, after detailed analysis, it was discovered that there were lots of gaps in the data. A lot of the reports were incomplete and did not cover the anticipated reporting period thus making it unreliable and unacceptable for sole use in the quantification.

Other issues that affected the reliability of the consumption data from the health facilities include, the fact that some of the facilities were out of stock of various weight bands of ALu and also of various other antimalarials during the reporting period. In some cases, when one ALu weight band was stocked out, other weight bands were substituted, thereby distorting consumption trends based on issues data. There were huge variations from facility to facility on how long these stock outs lasted. There was also the issue of the continued use of other treatment regimens not found on the current guidelines including the use of monotherapies and SP for treatment of uncomplicated cases of malaria.

The morbidity data although more reliable, could not be used solely for the quantification because of the need to determine the breakdown of use of ALu by weight bands. The team decided since some data on consumption was available from the facilities; it would be more realistic to base the breakdown by weight bands on evidence of use rather than on pure assumption. The team thus selected district malaria reports that were deemed complete and realistic and used their consumption data to calculate an average breakdown by weight bands.

KEY CONSIDERATIONS

This forecast was driven by considerations and assumptions based on information that had been collected and documented, or based on validated opinions from program officials, implementing partners and other stakeholders.

² Medical Stores Department (MSD) is a para-statal of the Government of Tanzania, or “semi-autonomous department” of the Ministry of Health and Social Welfare. Oversight is provided by the Pharmaceutical Supplies Unit (PSU)

In arriving at the total number of episodes to plan treatment requirements for, the team had discussions with NMCP program management and staff and agreed to use figures on malaria episodes reflected in the Global Fund Round 7 application. Based on these discussions, the team agreed to estimate total requirements to treat 20 million cases of malaria in the next year. The above figure took into consideration the following: the population at risk, the prevalence by regions, the effect of seasonality on prevalence, and the adherence to Standard Treatment Guidelines and access to health care facilities.

For this quantification, it was also considered that the switch from SP as first line drug for treatment of uncomplicated malaria to ALu was complete in all facilities and the new STG that had been adopted was being adhered to by all service providers and all prescription of antimalarials follow the recommended guidelines. Though the switch from SP to ALu may not be totally complete, program staff feel that adherence to the new STGs is generally quite good and improving.

The table below summarizes the conditions to be treated and the recommended treatment guidelines. For a detailed table see Table 2: Tanzania’s National Standard Treatment Guidelines.

Table 5: Standard Treatment Guidelines (summarized)

Condition	Treatment Regimen
Uncomplicated malaria (first line treatment)	Artemether-lumefantrine (ALu) (20mg/120mg) tablets according to weight bands
Uncomplicated malaria (second line treatment*)	Quinine
Severe Malaria in Adults	Quinine inj + Quinine sulphate tablets or Alu
Severe Malaria in Children	Quinine inj + Quinine sulphate tablets or Alu
Convulsions in severe malaria	Diazepam and phenobarbitone
Uncomplicated malaria treatment in pregnancy	First trimester : quinine sulphate tablets After first trimester : Artemether-lumefantrine (ALu) (20mg/120mg) tablets
Intermittent Preventive Treatment in Pregnancy	Sulphadoxine /pyrimethamine 500mg/25mg tablets

In estimating the national requirements the team decided to use the morbidity based methodology since there was information provided by the program of the number of episodes of malaria to be treated during year 1 of the forecast period. The team also used information on consumption from the facilities as a proxy to estimate the breakdown of use by weight bands. This was informed using data captured in the quarterly district malaria reports for 2006 and 2007.

The table below compares the anticipated weight band breakdown used to determine the composition of the kits with the breakdown of treatments by weight-band for the 10 million uncomplicated malaria episodes captured in the district malaria reports cited above. Consumption of the smallest weight band has been 13% lower than expected while consumption of the largest weight band, the most expensive, is about 10% higher than anticipated. Although the data from the district malaria reports was able to provide an evidence base for estimating consumption trend, there are limitations to this estimate since there was incomplete reporting from the districts, and periodic stock-outs occurred leading to substitution of ALu weight bands. This was evident in the third quarter consumption report which did

not follow the trend of the other 3 quarters. The consumption reports were thus used as a representative sample to predict the breakdown of consumption by weight bands, not to extrapolate absolute quantities consumed.

Table 6: Actual weight band consumption vs. anticipated consumption

Weight-band	Consumption	Anticipated
ALu Yellow (1x6)	23.23%	36%
ALu Blue (2x6)	18.28%	18%
ALu Pink (3x6)	13.17%	10%
ALu Green (4x6)	45.32%	36%

For SP, it was estimated that the first dose of IPT(p) will be received by 80% of pregnant women while the second dose will be received by 50%. These estimates are based on the 2007 TNVS survey where uptake of SP is estimated for IPT(p)1 at 65% and IPT(p)2 at 30%. This figure was thus adjusted to account for expected improved availability of SP, as well as positive behavior change in SP consumption for IPT(p).

For severe malaria it was agreed that 3.5% of all malaria cases would progress to severe malaria. Estimates were made based on this to calculate commodity needs for treatment of severe malaria in adults and children. Specific commodity needs for malaria in pregnancy were also calculated as a separate regimen since women in the first trimester receive quinine instead of ALu.

The total cost for commodities to be procured between May 1, 2008 and April 30, 2009 is \$26,430,621. This amount is not just for expected consumption during that period but also to procure buffer stock at an appropriate level and maintain a full pipeline. ALu procurement for the NMCP is funded by the Global Fund Round 4 funding. The grant is in the process of agreeing Phase 2 renewal. All other public sector anti-malarial commodities are procured with funds from the Medical Stores Department (MSD) revolving drug fund.

FORECAST RESULTS

As discussed earlier, the team used Quantimed and PipeLine software programs to carry out the forecast and supply planning. The Quantimed software is a tool designed to facilitate the process of determining the quantities of medicines and related supplies required for a health program. PipeLine is a software tool designed to help program managers monitor the status of product pipelines and plan procurement.

All the information collected was entered into Quantimed software along with the assumptions on the expected number of malaria episodes based on the various conditions described above for the forecast period, and the breakdown of use of ALu by weight bands.

Table 7 outlines the elements and parameters used in the quantification.

Table 7: Overview of Quantification Elements and Parameters

Elements of Quantimed Database Used in Quantification	Parameter Details
Quantification method	Morbidity/ logistic-based quantification
Established list of medicines	STGs used to provide information on Antimalarial medicines in use in Tanzania Mainland
Established cost parameters, currency codes, currency exchange rates, and price types (several sources)	MSD Purchase prices and USAID DELIVER PROJECT procurement prices
Established health conditions	Based on the STGs
Regimens and percentages established for each health condition	Based on STGs and agreed assumptions
Morbidity-based scaling-up estimates	Based on seasonality
Quantification reports	Type of antimalarials, estimated requirements and price, and regimen breakdown

The results and reports generated from Quantimed were then exported to an excel spreadsheet and analyzed. The reports included the quantities of antimalarials required to manage the malaria episodes during the forecast period, and the total cost of these requirements.

Table 8 presents the total requirements for each specific medicine for two years. Preventive measures, such as net coverage, and other interventions, including improved diagnostic testing and vector control via indoor residual spraying (IRS), are expected to reduce the number of malaria episodes thereby reducing the number of cases receiving treatment. Despite this anticipated reduction in cases of malaria, the team decided to maintain the same consumption of ALu for year 2 as projected for year 1 of the forecast period. As actual consumption data become available, procurement quantities, delivery schedules and arrival dates would be adjusted to reflect the actual consumption patterns.

Table 8: Forecast Results (2008 – 2010):

Product	Unit	May 2008 – April 2009	May 2009 – April 2010
ALu Yellow (1X6) 20mg+120mg	Disp of 30 treatments	168,667	168,667
ALu Blue (2X6) 20mg+120mg	Disp of 30 treatments	123,333	123,333
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	86,667	86,667
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	305,000	305,000
Diazepam 5mg/amp	b/100	3,600	3,600
Phenobarbitone 200mg/vial	b/100	800	800
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	363,000	363,000
Quinine sulfate 300mg/tab	b/1000	23,522	23,522

Product	Unit	May 2008 – April 2009	May 2009 – April 2010
Sulfadoxine-Pyrimethamine 500mg+25mg/tab	b/100	64,177	64,177

PIPELINE REVIEW

Reviewing the supply pipeline is a critical activity in the management of health commodities to determine the level of stock in country periodically so that appropriate measures can be initiated well in advance to correct any stock imbalances.

During this activity, the team met with MSD officials. The aim of the meeting was to obtain information on the management of antimalarials. At this time it wasn't possible to take a physical inventory of the medicines in stock but the team was provided a print out of the stock situation from the warehouse database.

Table 9: Stock Status at MSD

Stock on Hand at MSD as at 04/30/08		
Product	Unit	Quantity
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	61,003
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	82,360
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	34,314
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	74,637
Diazepam 5mg/amp	b/10	17,743
Phenobarbitone 200mg/vial	b/100	0
Stock on Hand at MSD as at 03/31/08		
Product	Unit	Quantity
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	147,978
Quinine sulfate 300mg/tab	b/1000	6,623
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/500	2,244
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/100	41,806

To be able to add value to the pipeline review process, it is necessary to estimate how long the current stock would last. This is usually calculated using the average monthly consumption. Because consumption data from the health facilities were not completely available, it was difficult to make a realistic estimate of how long the stock would last.

The table below shows the stock status analysis based on the forecasted consumption arrived at after this activity, as of April 30, 2008.

Table 10: Projected Months of Stock on hand at MSD as at 04/30/08

Product	Unit	Quantity	Forecasted AMC	Months of Stock
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	61,003	14,055	4.3
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	82,360	10,278	8
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	34,314	7,222	4.8
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	74,637	25,416	2.9
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	147,978	30,250	4.9
Quinine Sulfate 300mg/tab	b/1000	6,623	1,960	3.4
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/500	2,244	1,069	2.1
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/100	41,806	5348	7.8
Diazepam 5mg/amp	b/100	2,195	480	3.2

N:B . It should be noted that the months of stock is calculated using the forecasted consumption from the quantification activity and not from the distribution figures from MSD. That analysis can be carried out separately but using distribution data would not adjust for the periods of stock-out, thus perpetuating poor availability.

SUPPLY PLANNING

In developing the procurement plan, the team took into consideration the forecasted consumption, the current stock on hand and the orders that had been placed and when they were expected in country. The team also adopted a desired stock level of the total in-country pipeline of 14 months maximum stock level and 8 months minimum stock level.

As described above, the forecast was done using Quantimed and the result obtained from this process was adjusted to take into consideration wastages including damages, pilferage, and other losses. The final forecast figures were then entered into the PipeLine software to calculate actual numbers of drugs to be ordered during the forecast period, and when they should be scheduled to arrive so that stock on hand always fluctuates between the designated desired maximum and minimum stock levels. PipeLine software requires the following data set for procurement planning:

- stock on hand
- quantities of medicines on order but yet to be received
- Forecasted consumption

In planning procurement, PipeLine also takes into consideration the pre-established buffer stock levels and the procurement lead times.

The forecast results (estimated monthly consumption) were used by PipeLine software to calculate the actual quantities of each drug to be procured to bring the inventory level to the maximum months of stock. This action also took into consideration the stock on hand (total in-country), the quantities of medicines on order, the buffer stocks and supplier lead times.

Taking all these data sets into consideration, Pipeline then produces an output recommending an appropriate delivery schedule of each product to ensure proper stock management between the desired and established maximum and minimum inventory levels. This process will ensure continuous availability of drugs to the patients that need them, as well as minimize wastage that might occur due to overstock and expiry.

It is recommended that procurement contracts should be constructed to allow for flexible delivery based on demand. This type of system would provide for adequate quantities of medicines in the system at all times, and avoid overstocking and/or under stocking.

Table 11: Stock of antimalarials already ordered and expected date of arrival in country:

Product	Unit	Quantity	Expected Arrival Date
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	32,666	May 2008
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	24,501	June 2008
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	21,543	May 2008
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	16,158	June 2008
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	16,426	May 2008
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	12,321	June 2008
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	38,744	May 2008
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	29,057	June 2008
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	120,000	April 30, 2008
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	300,000	May 31, 2008
Quinine Sulphate 300mg tabs	b/1000	17,500	May 15, 2008

Product	Unit	Quantity	Expected Arrival Date
Quinine Sulphate 300mg tabs	b/1000	17,500	May 22, 2008
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/100	64,500	May 15, 2008
Sulfadoxine-pyrimethamine 500mg+25mg/tab	b/100	64,500	July 2008

Table 12 below presents a procurement plan based on forecasted consumption for ALu. As noted previously, ALu is procured with funding from Global Fund and this procurement plan assumes that Phase II Round 4 will be signed in time for the first consignment to arrive September 2008. Additionally, this plan assumes that the weight band distribution of the kits will be revised to reflect the weight band breakdown used in the forecast.

Table 12: Additional proposed orders for ALu based on the forecasted consumption to be procured by the end of 2009:

Product	Unit	Quantity	Proposed Arrival date
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	95,752	Sep 2008
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	33,810	Dec 2008
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	67,204	Feb 2009
ALu Yellow (1x6) 20mg+120mg	Disp of 30 treatments	44,510	Jul 2009
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	35,777	Sep 2008
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	24,606	Dec 2008
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	49,212	Feb 2009
ALu Blue (2x6) 20mg+120mg	Disp of 30 treatments	32,808	Jul 2009
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	46,468	Sep 2008
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	17,295	Dec 2008
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	34,582	Feb 2009
ALu Pink (3x6) 20mg+120mg	Disp of 30 treatments	23,035	Jul 2009
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	242,941	Sep 2008

Product	Unit	Quantity	Proposed Arrival date
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	60,849	Dec 2008
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	121,698	Feb 2009
ALu Green (4x6) 20mg+120mg	Disp of 30 treatments	81,135	Jul 2009

Table 13 below presents a procurement plan for quinine injections and tablets and phenobarbitone and diazepam. SP is not included because stock on hand will be sufficient beyond the two-year procurement plan, assuming that all deliveries arrive as scheduled and forecasted consumption does not drastically increase. Once the second and final scheduled shipment of 64,500 boxes of 100 tablets arrives in July 2008, stock on hand should be sufficient for the period beyond the forecast. (28 months) Phenobarbitone is currently stocked-out. This plan assumes a three month lead time and proposes a delivery date in August 2008 that will cover needs until March 2009.

Table 13: Proposed procurement plan for Quinine, Phenobarbitone, and Diazepam

Product	Unit	Quantity	Proposed Arrival date
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	160,822	Feb 2009
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	99,000	Jul 2009
Quinine Hydrochloride [(300mg/ml) 2ml inj] 600mg	b/10	122,000	Dec 2009
Quinine Sulphate 300mg tabs	b/1000	10,315	Feb 2009
Quinine Sulphate 300mg tabs	b/1000	7,440	July 2009
Quinine Sulphate 300mg tabs	b/1000	9,41	Dec 2009
Diazepam 5mg/ml inj	b/100	2,546	Aug-2008
Diazepam 5mg/ml inj	b/100	960	Dec-2008
Diazepam 5mg/ml inj	b/100	2,640	March-2008
Diazepam 5mg/ml inj	b/100	960	Dec-2008
Phenobarbitone 10mg/ml inj	b/100	1,000	Aug-2008

Product	Unit	Quantity	Proposed Arrival date
Phenobarbitone 10mg/ml inj	b/100	426	March-2008
Phenobarbitone 10mg/ml inj	b/100	219	Dec-2009

RAPID DIAGNOSTIC TEST KITS

At the time of the technical assistance visit, RDTs were being piloted in 3 districts. Pending award of Global Fund Round 7 funding, the nationwide phased roll-out of RDTs will begin sometime in 2008 and by the end of the year, it is expected that RDTs will be in use in three regions including Kagera, Iringa, and Dar es Salaam. This includes children and adults. Based on these considerations, it was estimated that RDT usage in these three regions for one year will be 2,790,570 RDTs. It was agreed that a procurement plan will be prepared once funding is awarded and the roll-out plan is finalized.

II. ACCREDITED DRUG DISPENSING OUTLETS (ADDO) PROGRAM

BACKGROUND

Tanzania's National Health Policy and Health Sector Reforms aim to improve access to quality health care, including provision of pharmaceutical services, to all population in urban and rural areas in an equitable manner. Furthermore, Public Private Partnership is emphasized in order to enable private sector to compliment health service delivered by the public sector (MOHSW 2003).

Accredited Drug Dispensing Outlets (ADDOs) also known in swahili as “Duka la Dawa Muhimu (DLDM)”, constitute a network of upgraded Duka la Dawa Baridi (DLDBs) to provide non-prescription and a limited list of approved prescription essential medicines in licensed retail outlets in Tanzania.

The establishment of ADDOs resulted from a public-private initiative headed by the Ministry of Health and Social Welfare and the Tanzania Food and Drug Authority with technical assistance from Management Sciences for Health, with a goal of improving access to affordable, quality medicines and pharmaceutical services in underserved communities. To achieve this goal, the ADDO program developed a dispenser training program covering issues such as how to identify and counsel patients on common health problems, such as malaria, and dispense appropriate treatment. Outlet owners are trained in regulations, ethics, and basic business management. In addition, the initiative provides owners business incentives and strengthens the supervision and regulatory system by delegating related activities to local government authorities.

The early success of ADDOs in the Ruvuma region, where the initiative was piloted, led to the Tanzanian government's decision to expand ADDOs to all 21 regions nationwide. Through the President's Emergency Plan for AIDS Relief, the U.S. Government is supporting a scale-up in Morogoro region, while the Government of Tanzania is financing the rollout in Mtwara and Rukwa regions. In addition, the Tanzanian Government and USAID are expanding the scope of services that ADDOs provide by using them to strengthen community-based health care interventions in child health, home-based care for HIV/AIDS patients, and rolling out of ACTs.

The aim of ADDO Program is to ensure that more than 80% of rural and peri-urban areas in Tanzania Mainland have an opportunity to purchase quality assured basic medicines from well-regulated and properly operated private medicine outlets manned by trained personnel by 2010.

The Tanzanian Food and Drug Authority (TFDA) and the MOHSW have designed a plan to convert all duka la dawa baridi to ADDOs by 2010 but the specific roll-out plan is not yet finalized. Tanzania was also awarded funding from the Global Fund Round 7 for procurement of ALu to be distributed in these outlets as the ADDO programs expands.

Training on dispensing of ALu was integrated into this program in 2006. Distribution of subsidized ALu is currently taking place in 553 ADDOs in Morogoro region and 210 ADDOs in Ruvuma (total: 763 sites).

With funding from PMI the USAID | DELIVER PROJECT procured 532,770 ALu treatments that arrived in October 2007³ and are stored and managed by Pyramid Pharma, a private wholesaler and distributor. Regional distributors purchase dispensers of 30 treatments from Pyramid whereas due to the cost of the treatment, the ADDOs purchase individual blisters (treatments) rather than dispensers. Green and pink blisters are sold to the public by the ADDOs at a cost 1500 Tsh each and the yellow and blue blisters at a cost 500 Tsh. The regional distributors get their stock from Pyramid Pharma and the ADDOs travel to the regional distributors who are then expected to collect order forms from each of the ADDOs. This data is then reported to Pyramid Pharma to track consumption.

FORECAST METHODOLOGY

As discussed above, the ADDO program is set up to complement public health facilities by providing access to ALu through the private sector. The ADDOs are expected to purchase stock up front from the regional distributors and in turn resell to the population. Due to lack of capital to procure in bulk, the ADDOs are allowed to procure by individual treatments. The number of treatments they purchase at any one time is thus driven by the demand by the patient population so as not to immobilize their limited capital.

To arrive at a methodology to use to forecast consumption, the team therefore took into consideration the following:

1. The historical pattern of consumption of ALu from the ADDOs: In the absence of a report of sales of ALu from the ADDOs, the number of treatments procured by the ADDOs from the regions was used as proxy consumption. The period of January through March was chosen, since before that, districts were progressively coming on board one area at a time.

Table 14: No of treatments of ALu purchased by ADDOs between Jan – Mar 2008

Product	No. of treatments	%
ALu Yellow (1x6) 20mg+120mg	6,805	29%
ALu Blue (2x6) 20mg+120mg	5,839	25%
ALu Pink (3x6) 20mg+120mg	2,101	9%
ALu Green (4x6) 20mg+120mg	8,355	36%
TOTAL	23,100	

2. Another consideration was the plan to scale up the ADDO to the rest of the regions. It is difficult to project how many ADDOs will come on board and when because of the uncertainty about when the GF money will become available. It is also difficult to say if scaling up of the number of ADDOs will automatically result in an explosion in their ALu sales, particularly since the GF Round 7's approach emphasizes under 5's, and sales of monotherapy in some private outlets continue. Looking at the current numbers in the table above, the consumption figure during the period has been far below the estimated 50,000 treatments per month which was used during the previous quantification

³ MSH conducted the initial procurement of ALu for the ADDO program and purchased 113,280 treatments in the Spring of 2007. Due to delays with ADDO-specific labeling to safeguard against leakage, the first 113,280 were not available to the ADDOs until September 2007.

as the average monthly consumption, based on the overall number of all antimalarials sold through the ADDOs prior to the introduction of ALu. In addition, based on the reported ages of clients treated by previous ADDO sales of antimalarials prior to the introduction of ALu, the breakdown by weight band was expected to be 5%, 10%, 15% and 70%, starting with the smallest presentation and increasing to 70% for ALu Green (4x6).

Based on the considerations above, the team calculated the AMC per facility and assumed a scale up rate of 30 new ADDOs monthly till the end Dec 2009. This rate should be revisited as more ADDOs come on line. The table below compares percentage breakdown by weightband for ALu use in the public sector vs. ALu treatment procured by the ADDOs. The ALu green presentations account for a higher proportion of use/sales in both programs yet the blue presentations are somewhat higher for the private sector.

Table 15: Comparison of Weightband breakdown in the ADDOs and the Public Sector

Product	ADDOs	Public Sector
ALu Yellow (1x6) 20mg+120mg	29%	23.23%
ALu Blue (2x6) 20mg+120mg	25%	18.28
ALu Pink (3x6) 20mg+120mg	9%	13.17
ALu Green (4x6) 20mg+120mg	36%	45.32

FORECAST RESULTS

The project procures ALu for the ADDO program and these products are stored and managed by Pyramid Pharma on behalf of the program. Currently, this program is operating in Ruvuma and Morogoro and 763 sites have been accredited under the program out of a possible 1082 existing DLDBs in these regions. With funding expected from the Global Fund Round 7 proposal, the program is expected to expand to additional sites but the specific roll out plan including timelines is not yet available.

Given the current rate of consumption, stock levels are sufficient for the forecast period so a procurement plan was not prepared. It is also important to monitor the stock closely and take other measures to utilize all the stocks as they get closer to their expiry dates. The current stock still has over a year of shelf life.

Table 16: Forecast Results

May 1, 2008 - Dec 31, 2009				
Product	Unit	Quantity	AMC	%
ALu Yellow (1x6) 20mg+120mg	treatments	63,299	3,165	29%
ALu Blue (2x6) 20+ 120mg	treatments	54,314	2,716	25%
ALu Pink (3x6) 20mg+120mg	treatments	19,543	977	9%
ALu Green (4x6) 20mg+120mg	treatments	77,717	3,886	36%

PIPELINE REVIEW

In order to plan procurements, it is necessary to determine the current stock on hand and how long the stock would last.

The table below shows the stock on hand on the day of the visit of the team. Based on the stock on hand and the forecasted consumption, the team determined that there was enough stock in the system and that there wasn't any need to plan further procurements during the forecast period. In fact, if the rate of distribution through the ADDOs does not increase dramatically, there is a high risk of expiries if stocks are not shifted to another program. This will have to be monitored carefully.

Table 17: Stock on hand at Pyramid Pharma as at 04/12/08

Product	Unit	Quantity	Months of Stock
ALu Yellow (1x6) 20mg+120mg	Treatments	164,164	52
ALu Blue (2x6) 20mg+120mg	Treatments	100,320	37
ALu Pink (3x6) 20mg+120mg	Treatments	51,840	53
ALu Green (4x6) 20mg+120mg	Treatments	199,200	51

III. UNITED NATIONS HIGH COMMISSION FOR REFUGEES (UNHCR)

BACKGROUND

UNHCR currently runs 5 refugee camps located in Northwestern Tanzania. These camps are made up of refugees mainly from Burundi and The Democratic Republic of Congo. Since the beginning of 2007, the population has scaled down considerably, with more than 100,000 refugees leaving the camps and as of March 2008, there were 198,676 refugees. By the end of 2008 UNHCR estimates there will be 106,605 refugees remaining and two camps will have closed altogether. In January of 2007 ALu was adopted as standard first line treatment and RDTs were also introduced for diagnostic testing. In addition to the refugee populations, an estimated 20% of population served at the camps includes Tanzanians living in the surrounding areas. They have also been able to benefit from the availability of rapid diagnostic testing and ALu treatment by accessing health facilities located inside the camps.

On behalf of PMI, the USAID | DELIVER PROJECT has procured 350,000 RDTs and 146,730 ALu treatments that are being distributed through the camps. For FY08, PMI has allocated \$400,000 for procurement of additional ALu.

FORECAST METHODOLOGY

In forecasting the ALu requirements for the UNHCR program, the team decided to use a mix of morbidity and consumption data. The morbidity data provided the number of episodes of malaria to be treated while the consumption data provided information on the proportion of use of ALu by weight bands.

Table 18: Average monthly consumption: Jan – March 2008

Product	Unit	Quantity
ALu Yellow (1x6) 20mg+120mg	treatments	8,742
ALu Blue (2x6) 20mg+120mg	treatments	6,580
ALu Pink (3x6) 20mg+120mg	treatments	6,576
ALu Green (4x6) 20mg+120mg	treatments	8,738

Other considerations used in the forecast included the anticipated scaling down of the population from 198,676 in March 2008 to 106,605 by January 1st 2009.

FORECAST RESULTS

The total number of ALu treatments required from May 2008 to Dec 2008 is reflected in the table below by weight bands. Although the team was informed that the refugee population is expected to decrease from about 200,000 in April 2008 to about 106,605 by end Dec 2008, during this period, it was agreed that there would be a total of 203,862 episodes of malaria to be treated. This was based on the average number of cases treated in the first quarter of 2008 and the assumption that the refugee

population would be about 144,000 instead of the projected 106,000. This was calculated using a linear regression projected through December 2008 based on the actual rate of decline of the population between January and March 2008 (from 210,834 – 198,676). Table 16 presents forecasted consumption for the remaining 8 months of 2008.

For the period January 2009 – December 2009, it was projected that 210,689 episodes of malaria will be treated broken down in the same ratio as in the table below. This number was based on the assumption that the decline in population would reflect the rate above such that at the end of 2009, the population in the camps would be 71,735. Given that a table showing the number and treatments and breakdown for January 2009 – December 2009 would be almost identical to the table below, a separate table has not been included.

Table 19: Forecasted consumption: May – Dec 2008

Product	Treatments	%
ALu Yellow (1x6) 20mg+120mg	58,162	28.53%
ALu Blue (2x6) 20mg+120mg	43,790	21.48%
ALu Pink (3x6) 20mg+120mg	43,769	21.47%
ALu Green (4x6) 20mg+120mg	58,141	28.52%
TOTAL	203,862	

PIPELINE REVIEW AND SUPPLY PLANNING

The table below shows the stock on hand as at April 15 2008. This figure was provided by the medical officer in charge of the camps.

Table 20: Stock on hand as at April 15, 2008

Product	Treatments	Months of Stock
ALu Yellow (1x6) 20mg+120mg	41,400	6
ALu Blue (2x6) 20mg+120mg	33,540	6
ALu Pink (3x6) 20mg+120mg	36,780	7
ALu Green (4x6) 20mg+120mg	69,650	10
TOTAL	181,370	

It should be noted that the stock on hand is less than the consumption forecasted for the remainder of CY 2008, but this may drastically change if the decline in population meets the Dec 31, 2008 target of 106,605. As such the population scale down should be closely monitored and stock adjustments made accordingly.

At this point in time it is unnecessary to develop a procurement plan since the stock on hand is projected to cover the needs till the end of December 2008 if the scale down plan holds. The stock situation of the UNHCR should be closely monitored after the end of 2008 and any further stock needed should be drawn from the stock at ADDO to minimize the risk of expiry of ALu at the ADDOs.

RAPID DIAGNOSTIC TEST KITS

During the forecast activity, the team was provided with the total quantity of RDTs in stock (149,000) with an expiry date of September 2009. Subsequent to the activity, it was learned that 143,000 of the RDTs will actually expire in August of 2008 and only 6,000 RDTs will expire in September 2009. Since a recent shipment of 350,000 RDTs was received in late May, based on the total number of tests expected to be dispensed from June – August 2008 (Average monthly consumption of 25,879), it is expected that the stock on hand would last for about 19 months for that 3 month period, as shown in Table 18 below. AMC is based on information provided by the program that each patient with suspected case of malaria is tested.

Table 21: Stock on hand as at May 30 2008

Product	(No. of tests)	AMC June - August 2008	Months of Stock
Rapid Diagnostic Test (RDT)	499,000	25,879	19

After the stock on hand is adjusted for the 149,000 stock that expires in August, the program will have 356,000 RDTs as of September 1, 2008. Using forecasted AMC (25,879) UNHCR will have approximately 14 MOS until the end of 2008. As population decreases in the camps, RDT consumption is expected to decline and from Jan – Dec 2009 (average monthly consumption of 17,557), the remaining stock is expected to last for 14 months.

Table 22: Projected stock as at January 1, 2009

Product	(No. of tests)	AMC Jan – Dec 2009	Months of Stock
Rapid Diagnostic Test (RDT)	252,484	17,557	14

CHALLENGES

PUBLIC SECTOR

- Data availability and quality: Routine data from the facility level are available on malaria episodes for under 5's and over 5's as well as reports on consumption per weight band are available. However, reporting rates are not consistent and weight band substitution (e.g. using two ALu blues in place of one ALu green) may skew the average breakdown of consumption by weight band.
- MSD stock status data: MSD data on stock on hand, issues, and receipts were found to be inconsistent. There were notable inconsistencies between the beginning balance, stock received, stock distributed and the ending balance. The ending balance of stock analysis was used since these figures were conceivably the most current at the time of the visit. It should be noted that a recent audit of the Global Fund grants (HIV and Malaria) to Tanzania had noted that some ALu shipments which were known to have been received, were not recorded in the MSD database. To be able to determine the reason for the discrepancies NMCP conducted a physical inventory of ALu stocks and the figures were those that the team obtained from the MSD database. However, the team was unable to conduct a physical inventory of the other anti-malarial treatments.
- Possible delay of Phase 2 procurements for ALu: As discussed above, MSD had some problems with the Global Fund related to accountability of stock procured with Global Fund grants. This led to the suspension of further disbursement of funding to procure ACT particularly phase 2 funding. Nevertheless, an explanatory letter was submitted to the Global Fund by Tanzania's Prime Minister's Office to satisfy questions about recent investigations of ALu procurement and storage. At the time of this quantification, no response had been received from Global Fund. However, a quantification specifically for the amount to be made available under Phase 2 so that once the funding is released, procurement can be initiated immediately.
- Procurement processes: Following discussions held during the team's meeting with the Director of Procurement at MSD, it was revealed that the international procurement process is very lengthy, ranging from 6-9 months for normal procurement with international tendering. This tends to hamper the continuous availability of medicines when needed. Although there is provision to carry out emergency procurement, using national tenders, the value threshold is very limited and it is related to total cost of the medicines instead of the volume of treatment courses the medications would provide or how long the stocks would last. Therefore, if a product's value is high (like quinine) the amount that can be procured using this process is fairly insignificant in terms of months of stock. Longer-term planning, therefore is the only answer.

ADDOS

- Data availability and Quality: As noted during the quantification of ACT for the ADDOs, information on actual consumption from the ADDOs was not available, as such the team relied on the quantities of treatment that were purchased by the ADDOs from the distributors as proxy

consumption figures. And since the first ADDOs only received their first stocks in September/October 2007, and others progressively began over the next 3 months, there is not yet enough data to reliably establish what overall distribution rates will be when all the ADDOs are stocked up and operating at full capacity.

- **ALu overstock:** The rate of scaling up of the ADDOs had been slower than anticipated and as such consumption has been much slower than originally anticipated. With a shelf life of less than 2 years at the time of arrival in country, there is a possibility of expiries if the rate of consumption of ALu stays at the current level. Should consumption remain slow, alternative uses of current stock held by Pyramid should be explored to avoid expiries (eg. transfer to UNHCR's refugee program, transfer to the Clinton Foundation-funded pilot test of distribution through DLDBs, etc.)

UNHCR

- **Population scale down rate:** A major challenge that was faced in forecasting for the UNHCR program was determining a scale down rate of the population during the forecast period. The program anticipates scaling down from a population of 198,676 in March 2008 to 106,605 in December 2008. This nevertheless is uncertain because factors that influence repatriation are difficult to predict.

RECOMMENDATIONS

PUBLIC SECTOR

- The pipeline data bases were developed using forecasted consumption figures. These should be updated regularly with actual consumption data from the facilities. This would enable orders to be adjusted as needed taking into consideration the rate of consumption of the products in country. This process ensures that the stock is managed appropriately thus minimizing the risk of overstocking /under stocking.
- It is recommended that at a minimum, the quantification is reviewed and revised every six months taking into consideration the possible changes in the variables that were used in the present quantification activity.
- There is the need to improve data availability through district reports and regular supervision. This would ensure that data used in the quantification is a true representation of the consumption trends in the health facilities.
- Distribution of antimalarials to the health facilities should be based on the consumption pattern of these products at the health facilities. This would ensure that there is no stock-piling of products that are not being used at the level of the health facilities while there may be other facilities in need of these products. The transition from the current push system to a pull system for ALu should therefore be encouraged and undertaken as soon as possible.
- Greater emphasis should be placed in tracking procurements and stock data in the MSD supply pipeline. This can be achieved by conducting physical counts of the stock of antimalarials quarterly and adjusting procurement accordingly.
- The establishment of quarterly meetings for partners to review antimalarial and RDT stock status is recommended. These meetings would provide a forum for a wide range of partners including NMCP, donors, MSD, and implementing partners to monitor trends in consumption of antimalarial commodities in light of expanding efforts to lower malaria incidence.
- There is the need to extend capacity-building activities to other in-country partners. During this visit, the PSU/NMCP Pharmaceutical Logistics Coordinator was introduced to the use of Quantimed and Pipeline software in forecasting and procurement planning for antimalarials. It is recommended that MSD staff be trained on the use of Pipeline to help them properly manage and track shipments and develop appropriate procurement plans.
- As efforts to make ALu more affordable and accessible are expanded to the private sector under the ADDO program with funding provided by the Global Fund Round 7, the potential shift of ALu consumption from the public to private sector should be monitored. The findings should be used to adjust the supply pipeline accordingly.
- Procurement lead times need to be shortened. Suggested means to do this include increasing the ceiling for emergency procurement and the Public Procurement Regulatory Authority (PPRA)

could also grant a process waiver to MSD to enable them to cut down on the procurement lead time to ensure continuous supply of products as and when needed.

- Initiate procurement of Diazepam and Phenobarbitone as soon as possible. Given the long lead times discussed above, it is essential that processes for procurement of Diazepam and Phenobarbitone be initiated as soon as possible.

FOR THE ADDOS

- As discussed in the report, the rate of consumption is very low and there is the risk of expiry. Measures should thus be adopted to ensure that these medicines are redistributed to other areas in need of ALu especially the UNHCR Program.
- Increased effort should be made in educating the population on the availability of ALu in the ADDOs at subsidized prices to increase rate of uptake.

FOR UNHCR:

- As discussed above, the scale down rate of the population is uncertain and this uncertainty translates into product availability. This situation should be closely watched to ensure that the camps do not stock out of antimalarials. In the case of low stocks of ALu, more stock can be accessed from the ADDO program.
- UNHCR's RDT stock is expected to last until February of 2010. Since there is no dedicated PMI funding for RDT procurement in FY08, it is recommended that Tanzania's FY09 MOP include funding for RDT procurement. It is difficult to forecast beyond a two-year period, especially given the unpredictability of the refugee population, however if consumption trends continue, approximately 175,000 RDTs will be needed for the remainder of 2010. Suggested funding levels and estimated quantities will be informed by the next annual quantification, to be completed in April of 2009.

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APPENDIX A

TECHNICAL ASSISTANCE SCOPE OF WORK

**USAID | DELIVER PROJECT/ REPUBLIC OF TANZANIA MINISTRY
OF HEALTH AND SOCIAL WELFARE**

TECHNICAL ASSISTANCE SCOPE OF WORK (DRAFT)

TASK ORDER 3: NATIONAL QUANTIFICATION OF ANTI- MALARIALS AND RDTs

BACKGROUND

Tanzania is a PMI priority country with approximately 93% of the population living in areas where malaria is transmitted and the FY08 operational plan provides \$34m for achieving specific treatment and prevention goals. As a recipient of PMI funds, the USAID | DELIVER PROJECT procures anti-malaria commodities for select programs on the mainland, including the accredited drug dispensing outlet (ADDO) program and UNHCR and; secondly, provides technical assistance to the Medical Stores Department (MSD) and other in-country partners to support supply chain management of anti-malaria commodities.

Although there are a number of anti-malaria related commodities, this activity will focus specifically on quantifying pharmaceuticals listed by Tanzania's Food and Drug Administration (TFDA) in standard treatment regimens. These include ACTs, quinine injections and quinine tablets, and Sulphadoxine /Pyrimethamine (SP). To support nation-wide roll-out of RDTs, these testing devices will also be included. ACTs were introduced in December of 2006 to replace SP as the standard first-line treatment. Quinine injections and quinine tablets are currently used for treating severe malaria and SP is used for intermittent preventive treatment in pregnancy (IPTp). Separate forecasts and procurement plans will also be prepared for the ADDOs and UNHCR since these commodities are procured by the USAID | DELIVER PROJECT.

PURPOSE

Under Task Order 3, with funding provided by the President's Malaria Initiative (PMI) the USAID | DELIVER PROJECT will collaborate with Tanzania's National Malaria Control Program (NMCP) to prepare national forecasts and plans for procurement of anti-malaria commodities for use on the mainland . This technical assistance will be provided by a two-person team with skills in forecasting, LMIS, quantification expertise and skills in use of appropriate quantification software (Pipeline, Quantimed, etc).

OBJECTIVES OF THE TRIP

The overall objective of this technical assistance is to ensure an adequate supply of anti-malaria commodities by informing procurement processes managed by the National Malaria Control Program, UNCHR, and the accredited drug dispensing outlet (ADDO) program. The data gathered by this forecasting and quantification exercise will be the backbone of a national malaria logistics coordinating committee that will serve as a forum for all stakeholders to monitor stock status of malaria-related commodities

This objective will be achieved by completing the following activities:

- Forecast national and programmatic needs for all treatment regimens (first, second and, severe) and for RDTs. Forecasts for the public sector and the ADDO and UNHCR programs will be prepared.
- Interview key informants about expected program results and patterns of consumption
- Review methodology and results of existing malaria quantifications
- Obtain information on procurement and donor plans and commitments
- Collect and review stock status data
- Conduct a physical inventory at MSD
- Input data into to Quantimed to forecast commodity quantities; import into PipeLine to plan commodity shipments
- Review forecast results and procurement planning with stakeholders
- Finalize forecast results and procurement plans in collaboration with stakeholders

Final results will be disseminated at the inaugural meeting of the national malaria logistics coordinating committee.

PROPOSED DATES OF THE VISIT:

APRIL 14 – 25, 2008

PROPOSED TA PROVIDERS:

ERIC TAKANG AND SUSAN DUBERSTEIN: USAID | DELIVER PROJECT

DELIVERABLES:

1. Brief/debrief with USAID/TZ staff as requested
2. Preparation of a Pipeline and Quantimed database
3. National forecast for anti-malaria standard treatment regimens and RDTs
4. Procurement plan for standard treatment regimens and RDTs
5. Presentation of forecast results and procurement plan at the inaugural meeting of the national coordinating committee
6. Submit a technical assistance record (TAR) to USAID/TZ and PMI within one week of completion of fieldwork.
7. Submit a final report of quantification findings no later than three weeks after completion of fieldwork.

APPENDIX B

PRINCIPAL CONTACTS

Charles Llewellyn, USAID/Tanzania

Michael Mushi, USAID/Tanzania

Ráz Stevenson, USAID/Tanzania

Tim Rosche, Chief of Party USAID | DELIVER PROJECT-Tanzania

Josephine Nyonyi, Logistics Advisor USAID | DELIVER PROJECT- Tanzania

Rene Salgado, Malaria Advisor, PMI/Tanzania

Alex Mwita, NMCP Program Manager

Winna Shango, Pharmaceutical Logistics Coordinator, NMCP/PSU

Nick Brown, ITN Cell Team Leader, NMCP

Fabrizio Molteni, RTI/NMCP

Kirsten Bose, Director, JHUCCP/Commit

Muthoni Kariuki, Program Manager, JHPIEGO/ACCESS

Gregory Kabadi, M& E Advisor, JHPIEGO/ACCESS

Jafary Liana, Senior Program Associate, MSH/SPS

Romuald Mbwasi, Country Director, MSH/SPS

Wilson Mlaki, Senior Program Associate, Malaria MSH/SPS

Jake O'Sullivan, RTI

Lucy Nderimo, Dir. Pharmaceutical and Technical Services MSD

Sylvester Matandiko, Director of Logistics, MSD

Abraham Okore , Managing Director Pyramid Pharma

Dr. Sunday Rwebangila, UNHCR

Peter McElroy, Epidemiologist CDC-Tanzania

Lorryanne Ward, Malaria Program Coordinator, Clinton Foundation

APPENDIX C

AGENDA

Agenda– Annual Malaria Quantification 2008						
SATURDAY April 12	SUNDAY April 13	MONDAY April 14	TUESDAY April 15	WEDNESDAY April 16	THURSDAY April 17	FRIDAY April 18
	Initial briefing with Country Director	10:00: Meet with USAID, CDC, and Rene Salgado	Mapping out the system and data review with NMCP	Data Review Cont.	9:00: Meet with Dr Fabrizio 11:00: Data validation and entry	9:00: Meet with MSH 10:30: Meet with Pyramid Pharma
USAID DELIVER PROJECT Consultants arrive		14:00: Meet with NMCP/PSU	Mapping out the system and data review (cont'd)	Meet with MSD	Data entry	14:00: Meet with Clinton Foundation

SATURDAY April 19	SUNDAY April 20	MONDAY April 21	TUESDAY April 22	WEDNESDAY April 23	THURSDAY April 24	FRIDAY April 25
		9:00 am: Meet with JHPIEGO/ACCESS	9:00: Meet with UNHCR (phone call)	Analyzing the result of the forecast	10:00: Debriefing with USAID	
		Meet with Dr Peter	Preliminary Debriefing with NMCP	Supply Planning	Supply Planning cont.	Departure

APPENDIX D

QUANTIMED OUTPUT

The table below is a screenshot of the output of medicine requirement from Quantimed software. The output is expressed in excel format. The top table lists requirements for each product in the smallest unit of measure (tablets or injections). The second table lists requirements for each product in packing size (e.g. dispenser of 30 treatments for ALU, or tins of 100 tablets for SP)

TZ NMCP Malaria Quantification April '08

Monthly Totals by Medicine

Product	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	Total
Artemeter (Y)-lumefantrine [ALU (Y)] 20+120MG tabs	4,038,395	4,038,395	2,019,198	2,019,198	2,019,198	2,019,198	2,019,198	2,019,198	2,019,198	2,019,198	2,019,198	4,110,434	30,360,006
Artemeter(B)-lumefantrine [ALU (B)] 20+120MG tabs	5,905,597	5,905,597	2,952,799	2,952,799	2,952,799	2,952,799	2,952,799	2,952,799	2,952,799	2,952,799	2,952,799	6,013,627	44,400,012
Artemeter(G)-lumefantrine [ALU (G)] 20+120MG tabs	29,208,000	29,208,000	14,604,000	14,604,000	14,604,000	14,604,000	14,604,000	14,604,000	14,604,000	14,604,000	14,604,000	29,748,000	219,600,000
Artemeter(P)-lumefantrine [ALU (P)] 20+120MG tabs	6,224,400	6,224,400	3,112,200	3,112,200	3,112,200	3,112,200	3,112,200	3,112,200	3,112,200	3,112,200	3,112,200	6,341,400	46,800,000
Diazepam [Diazepam] 5MG/amp; amps	47,999	47,999	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	24,000	48,008	360,006
Phenobarbital [IC] 200MG/vial; vials	10,667	10,667	5,334	5,334	5,334	5,334	5,334	5,334	5,334	5,334	5,334	10,669	80,009
Quinine Hydrochloride [Quinine Hydrochloride (300mg/ml) 2ml in]] 600MG; amps	483,997	483,997	241,999	241,999	241,999	241,999	241,999	241,999	241,999	241,999	241,999	484,021	3,630,006
Quinine sulfate [Quinine 300 tab] 300mg tabs	3,132,187	3,132,187	1,566,094	1,566,094	1,566,094	1,566,094	1,566,094	1,566,094	1,566,094	1,566,094	1,566,094	3,162,786	23,522,006
Sulfadoxine-pyrimethamine 500+25MG tabs	534,811	534,811	534,811	534,811	534,811	534,811	534,811	534,811	534,811	534,811	534,811	534,811	6,417,732

Product	May-08	Jun-08	Jul-08	Aug-08	Sep-08	Oct-08	Nov-08	Dec-08	Jan-09	Feb-09	Mar-09	Apr-09	Total
Artemeter (Y)-lumefantrine [ALU (Y)] 20+120MG; T/180	22,436	22,436	11,218	11,218	11,218	11,218	11,218	11,218	11,218	11,218	11,218	22,836	168,667
Artemeter(B)-lumefantrine [ALU (B)] 20+120MG; T/360	16,404	16,404	8,202	8,202	8,202	8,202	8,202	8,202	8,202	8,202	8,202	16,705	123,333
Artemeter(G)-lumefantrine [ALU (G)] 20+120MG; T/720	40,567	40,567	20,283	20,283	20,283	20,283	20,283	20,283	20,283	20,283	20,283	41,317	305,000
Artemeter(P)-lumefantrine [ALU (P)] 20+120MG; T/540	11,527	11,527	5,763	5,763	5,763	5,763	5,763	5,763	5,763	5,763	5,763	11,743	86,667
Diazepam [Diazepam] 5MG/amp; B/100	480	480	240	240	240	240	240	240	240	240	240	480	3,600
Phenobarbital [IC] 200MG/vial; B/100	107	107	53	53	53	53	53	53	53	53	53	107	800
Quinine Hydrochloride [Quinine Hydrochloride (300mg/ml) 2ml in]] 600MG; B/100	4,840	4,840	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	2,420	4,840	36,300
Quinine sulfate [Quinine 300 tab] 300MG/tab; B/1000	3,132	3,132	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	1,566	3,163	23,522
Sulfadoxine-pyrimethamine 500+25MG/tab; B/100	5,348	5,348	5,348	5,348	5,348	5,348	5,348	5,348	5,348	5,348	5,348	5,348	64,177

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USAID | DELIVER PROJECT

John Snow, Inc.

1616 Fort Myer Drive, 11th Floor

Arlington, VA 22209 USA

Phone: 703-528-7474

Fax: 703-528-7480

Email: askdeliver@jsi.com

Internet: deliver.jsi.com