Antimalarial Drug Management in One SANRU-Supported Health Zone in the Democratic Republic of the Congo: Rapid Assessment, May 2004

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About RPM Plus

The Rational Pharmaceutical Management Plus (RPM Plus) Program, funded by the U.S. Agency for International Development, works in more than 20 developing countries to provide technical assistance to strengthen drug and health commodity management systems. The program offers technical guidance and assists in strategy development and program implementation both in improving the availability of health commodities—pharmaceuticals, vaccines, supplies, and basic medical equipment—of assured quality for maternal and child health, HIV/AIDS, infectious diseases, and family planning and in promoting the appropriate use of health commodities in the public and private sectors.

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ACRONYMS

ANC	antenatal care
BCZS	Bureau Centrale de Zone de Santé (central office of a health zone)
BCZS-K	Bureau Centrale de Zone de Santé de Kabondo (Central Office of Kabondo Health Zone)
CIF	cost, insurance, freight
CMO	Chief Medical Officer
CMS	Central Medical Store
DEPHAKIS	Dépôt Pharmaceutique de Kisangani (Kisangani Regional Drug Depot)
DOT	directly observed treatment
DRC	The Democratic Republic of the Congo
ECC	Eglise du Christ au Congo
EML	essential medicines list
EUR	euro
FC	franc congolaise
HGR	*l'hôpital général de référence* (general referral hospital)
HIV/AIDS	human immunodeficiency virus/acquired immunodeficiency syndrome
ICP	Infirmier Chef du Post (chief nurse)
IDA	International Dispensary Association
IntD	International dollar
IPT	intermittent preventive treatment
MOH	Ministry of Health
MSH	Management Sciences for Health
NGO	nongovernmental organization
RBM	Roll Back Malaria
RPM Plus	Rational Pharmaceutical Management Plus [Program]
SANRU	Programmes de Santé Rurale
SOP	standard operating procedures
S/P	sulfadoxine/pyrimethamine
STGs	standard treatment guidelines
USAID	U.S. Agency for International Development
USD	U.S. dollar

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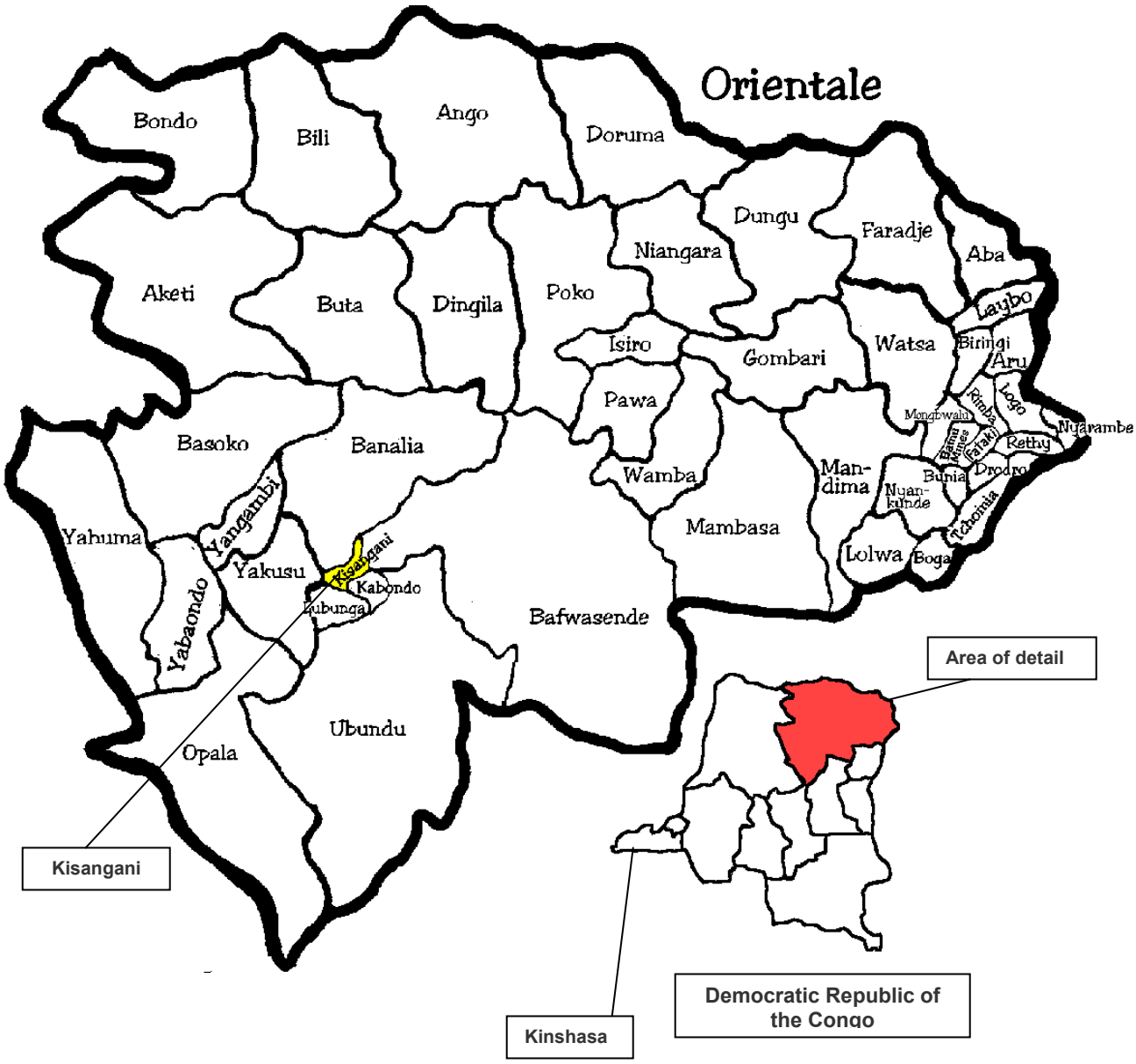
Staff of the General Referral Hospital for Kabondo
Staff of the Wanie-Rakula Health Center

MAP OF ORIENTALE PROVINCE, THE DEMOCRATIC REPUBLIC OF THE CONGO



Kisangani, the provincial capital, is shaded in gray. The smaller map (inset) shows location of Orientale Province within the Democratic Republic of the Congo.

Map of Orientale Province obtained from the Web site of the Democratic Republic of the Congo Ministry of Health, http://minisanterdc.cd/inspectiondistrictetzonedesante/kisangani.htm (accessed July 22, 2004)

SECTION 1. INTRODUCTION

Background

Malaria is one of the leading causes of mortality and morbidity in the Democratic Republic of the Congo (DRC), particularly for children under five. Approximately 95 percent of the population is at risk of malaria, with 1,414 cases of malaria per 100,000 of the population reported in the year 2000 (WHO 2000). In the same year it was estimated that, of the children under five seen at a health facility who were reported to have had a fever in the preceding two weeks, only 24 percent received an antimalarial medicine (WHO/UNICEF 2003, 81). In 2001, to improve the control of malaria in the country, the National Malaria Program developed its Roll Back Malaria (RBM) strategic plan for the years 2002 to 2006. This strategic plan focused on five key intervention areas—

1. To promote the large-scale use of insecticide-treated nets
2. To improve the case management of malaria in the health facilities
3. To improve the case management of malaria within the community
4. To use intermittent preventive treatment (IPT) to prevent malaria during pregnancy
5. To reinforce the capacity of the National Malaria Program and the health system in the provision of health care

Adequate management of pharmaceutical products impacts all these key intervention areas and is therefore essential for the achievement of the goals of the RBM strategy. Unfortunately, the majority of the population does not have regular access to affordable medicines of appropriate quality and does not always use the medicines they receive appropriately. To address some of these concerns, the government of the DRC established in 1987 a Central Medical Store (CMS), which was charged with the responsibility of procuring and distributing essential medicines to the public health facilities. This system has not functioned as envisaged, mainly due to the civil unrest of the last few years. To address this gap, several nongovernmental organizations (NGOs) that work with the Ministry of Health (MOH), such as the Santé de Rurale (SANRU) III project, have developed parallel procurement and distribution systems for the health zones they support.

Structure of the Health System

The health zone is the basic operational unit of the health care system in the DRC. Each health zone serves a population of approximately 150,000 people and consists of a general referral hospital (HGR), and approximately 20 health centers. Each urban health center serves approximately 10,000 people, and each rural health center serves approximately 5,000 people (Republique Démocratique du Congo [N.D.]). Ideally, each health zone is coordinated from a central office under the direction of the Chief Medical Officer (CMO) for the zone. By the end of 1986, there were 306 health zones, of which only two-thirds were providing the required primary

health interventions. Fifty percent of these functioning health zones were supported by NGO partners, with SANRU supporting the most health zones (Republique Démocratique du Congo [N.D.]). The main partners supporting health zones in the DRC are listed in Annex 1, and the basic components of a health zone are illustrated in Annex 2.

Since 2001, the MOH has been reviewing the distribution of health zones with a view to increasing the number to a little more than 500 health zones over the next few years. To better coordinate the support to the health zones, the MOH in collaboration with its partners has defined a global support package for each health zone. This package consists of the structural and operational costs of managing a health zone and focuses on interventions targeting priority health areas, including maternal and child health; provision of clean drinking water and hygiene; and priority diseases including malaria, HIV/AIDS, tuberculosis, and malnutrition. The package also includes a community intervention or outreach component. The cost of providing the global support package for each zone is estimated at approximately U.S. dollars (USD) 850,000. This amount is supplemented by fees paid by the clients seen at the health facilities—the health system in the DRC is based on a cost-recovery model.[1]

The SANRU III project is one NGO that has developed its own procurement and distribution system to meet the needs of the health zones it supports. The SANRU III project is managed by a partnership between Interchurch Medical Assistance, Inc., an association of U.S.-based Christian relief and development agencies, and the Church of Christ of Congo (*Eglise du Christ au Congo* [ECC]). The project is supported by the U. S. Agency for International Development (USAID) to provide support to rural health zones for priority primary health interventions.

As part of the Malaria Action Coalition, the Rational Pharmaceutical Management Plus (RPM Plus) Program was asked to assist in a rapid assessment of the drug distribution system in a selected SANRU-assisted health zone. This assessment would identify options for strengthening the drug supply system to increase access to antimalarial drugs within the SANRU-assisted health zones.

Assessment Objectives

The rapid assessment was carried out to determine the critical factors affecting the availability of effective and appropriate antimalarial drugs and commodities in the health zones supplied by the Central Pharmaceutical Depot in Kisangani (Dépôt Pharmaceutique de Kisangani [DEPHAKIS]).

Methodology

The study was primarily qualitative, using semistructured questionnaires supplemented by observations of the inventory management systems. The four SANRU-supported health zones in

[1] In 2001, 55.6 percent of the total expenditure on health in the DRC was out-of pocket expenditure. In the same year, the DRC had the lowest per capita gross domestic product (international dollars [IntD] 346) and the lowest per capita total expenditure on health (IntD 12) in Africa (WHO 2002).

Orientale Province, which are supplied by DEPHAKIS, were identified as the optimal study area. The area was selected primarily because this is the newest depot in the SANRU network and these health zones have just transitioned from a system of direct delivery of essential drug kits to a system requiring consumption-based procurement of loose medicines.

Of the four health zones identified, the Kabondo Health Zone was chosen as the site for logistical reasons. A team comprised of Grace Adeya (RPM Plus) and Ben Mambo and Kadi Aime (SANRU III) traveled to Kisangani between May 17 and 19, 2004, to interview key stakeholders. The semistructured interviews were conducted using a series of questions that had been developed by RPM Plus to obtain the relevant drug management information. Using these tools, interviews were conducted with key stakeholders from—

- SANRU III office in Kinshasa
- SANRU III regional office in Kisangani
- Central Office of Kabondo Health Zone (Bureau Centrale de Zone de Santé de Kabondo [BCZS-K])
- Kabondo HGR
- Wanie-Rakula Health Center (Kabondo Health Zone)

The pharmacy stores were also visited to observe the storage conditions and gather information on the inventory control systems in order to identify the key gaps in drug management practices at all the different levels of the drug supply chain.

SECTION 2. SANRU III DRUG MANAGEMENT SYSTEM

SANRU III is a USAID-funded project that supports 62 health zones, primarily in rural areas, in all regions of the DRC. The project began in 2001 and is a follow-on to SANRU I and II, which ran from 1981 to 1991. USAID terminated assistance between 1991 and 2001 due to the civil conflict in the country, though the ECC continued to provide some support to the health zones during this period. Through the office of the SANRU "Point Focal," in Kinshasa, SANRU III coordinates its support to these health zones through six regional offices. These regional offices are currently located in Bakongo, Bandundu, Equator, Gomo, Kasai, and Kisangani, and they communicate directly with the main office in Kinshasa. The project provides support to all components of a health zone to ensure access to services, focusing on infectious diseases, including malaria, tuberculosis, and HIV/AIDS; maternal and child health; nutrition; and water and sanitation. The project also provides administrative and managerial support to all levels of a health zone: training and supervision, including support to some nursing schools; rehabilitation of infrastructure; and procurement and supply of essential pharmaceuticals.

SANRU Health Zones in Orientale Province

SANRU supports four health zones in Orientale Province. The SANRU coordinating office for these zones is based in the province capital, Kisangani. Table 1 lists the four health zones and the approximate distance of the central office of each zone BCZS from the SANRU coordinating office in Kisangani. The poor road network in the province makes travel to all these health zones difficult. The Central Office of Kabondo Health Zone is the closest of the four, as it is adjacent to the city. Kabondo is also the most urban of all the health zones. These four health zones form the primary clients for the regional depot that has been established in Kisangani and that SANRU is supporting.

Table 1. Characteristics of SANRU-Supported Health Zones in Orientale Province

Health Zone	Population in 2003	Distance from Kisangani	Travel from Kisangani
Yakusu	169,167	25 km	• 11 km section is on the Congo River. • Total travel time is approximately 1–2 hours.
Opala	169,821	265 km	• Distance is >300 km when traveling on the river but this is the most effective means of travel. • Travel time is approximately 2 days if a motorized boat is used; otherwise it is 10 days.
Isangi	134,997	125 km	• Travel time is approximately 2 hours on a motorcycle (includes approximately 30 minutes to cross the river).
Kabondo[a]	199,949	—	• Time is less than 30 minutes to the BCZS.

[a] As part of the reorganization of the health zones in the DRC, the MOH plans to carve out a new health zone from the current Kabondo Health Zone. SANRU will be a full partner in what will be the new Kabondo Health Zone and will continue to provide some support to the new health zone during the transition period. No NGO partner has been identified for the new zone.

Pharmaceutical Supply System

When SANRU III started in 2001, the country was just coming out of a period of civil unrest and the national pharmaceutical procurement and supply system was not functional. The civil unrest also resulted in the absence of reliable statistics and the infrastructure required to develop a functioning drug procurement and distribution system. To fill this gap, SANRU III decided to develop and procure standardized essential drug kits for use in the hospitals and health centers in the SANRU-supported zones. The project supplied these kits directly to the health facilities from the central procurement warehouse in Kinshasa.

The kit system, however, proved to be impractical in the long run. The health facilities had no control over the contents of the kits or the quantities of the drugs included; and they could not control the timing of delivery. Because the disease burden differs depending on the region, the use of standardized kits resulted in the shortage of some drugs and the wastage of other drugs, depending on the location of the health facility. The use of regional depots and the change to a consumption-based procurement system was designed to remedy some of these problems.

Drug Supply Chain

The current drug supply system that SANRU III has developed is designed around the establishment of self-sustaining regional stores or depots. As illustrated in Figure 1, there is currently centralized procurement of the required pharmaceuticals through the Kinshasa office. The Kinshasa Central Warehouse distributes the pharmaceuticals to the regional depots for sale to the HGRs and the BCZS in the targeted health zones. The BCZS purchases the pharmaceuticals for distribution to the health centers in its zone. To avoid stock-outs of essential drugs as a result of the transition from the distribution of kits by the SANRU central office to a regional drug depot supply system, SANRU distributed start-up stocks of the essential drugs to the health facilities in its zones. The distributions to the health zones in Orientale Province were made in November 2003.

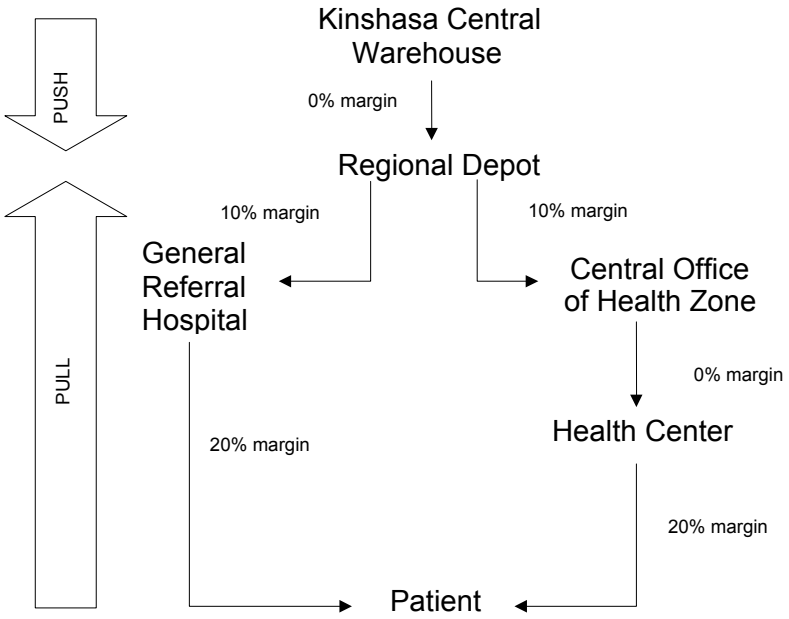


Figure 1. SANRU drug distribution system.

SANRU Regional Depots

SANRU directly supports four regional depots and manages two other regional depots in collaboration with the World Bank (Table 2). SANRU supplies subsidized drugs and other pharmaceuticals through these depots for sale to health facilities in the SANRU-supported health zones. SANRU subsidizes these products at several points in the supply chain. It manages and pays for the international procurement and delivery of the pharmaceuticals to the depots; it uses these products to establish lines of credit for the health facilities at the depots, effectively donating the pharmaceuticals to the health facilities. The financing system is described in later sections of this chapter. These subsidized pharmaceuticals are not available for purchase by non-SANRU–supported health facilities. Pharmaceuticals purchased by the depots using retained profits or other income may be sold to non-SANRU–supported health facilities.

Table 2. SANRU-Supported Regional Drug Depots

Depot	Province	Supported By
Karawa	Equator	SANRU
Vanga	Bandudu	SANRU
Kisangani	Orientale	SANRU
Cepecc	Kinshasa	SANRU
Chicapa	Kasai	SANRU/World Bank
Kamina	Katanga	SANRU/World Bank

Of the four depots that SANRU directly supports, Karawa, Vanga, Kisangani, and Cepecc, Kisangani has the only regional depot that was started new and was not based on an existing structure system. The other three depots existed previously. The Cepecc Depot had run into problems and collapsed prior to SANRU's involvement, and SANRU is supporting its reestablishment. Karawa and Vanga were also preexisting depots and were providing services prior to their partnership with SANRU. SANRU support is therefore not their only source of income. The Kisangani Depot currently relies entirely on the subsidized SANRU supplies.

Procurement by the SANRU Central Office

SANRU has a warehouse in Kinshasa where it stores all pharmaceuticals received, either though donations or procurements, for distribution to the regional depots and health zones. Most of the donations are received from the U.S.-based SANRU partners and are exempt from customs and taxes. For purchases, SANRU has a system for prequalifying its suppliers and has a minilaboratory for testing the essential drugs that they receive. Random tests are performed for all the drugs distributed to the regional depots and for all the kits distributed to the health facilities. At the time of the assessment, the only antimalarials being tested by this laboratory were sulfadoxine/pyrimethamine (S/P) and quinine preparations. The laboratory has the capacity to test for other antimalarial drugs but at present does not have the reagents needed.

SANRU procures most of the pharmaceuticals, including the antimalarials, from international suppliers, primarily from the International Dispensary Association (IDA). All the drugs procured are generics. The imports are exempt from customs and other taxes. The most recent procurement of S/P was received from IDA on April 3, 2004. Information from the invoice for this procurement is shown in Table 3. The unit price for one tablet, USD 0.0185, compares favorably with the international median price for suppliers in 2003, which was USD 0.0257 per tablet of S/P (Management Sciences for Health 2003). SANRU will continue to manage the international procurement for its drug supply network for the foreseeable future.

Table 3. Information from the Invoice for S/P Procured by SANRU on April 3, 2004

S/P Itemization	Unit Price (USD)	Total (USD)
1.609 million x 1,000 tabs	18.52	29,798.68
Sales discount		(1,097.47)
Transport insurance		178.79
Transport charges		3,695.00
Invoice total		**32,575.00**

Distribution by the SANRU Central Office

The SANRU central office coordinates the distribution of procured pharmaceuticals to the regional depots. The Kinshasa Central Warehouse functions essentially as a transit point for pharmaceutical products, and these products are usually distributed to the regions as soon as possible after arrival. SANRU organizes for the transport of the products to the regional depots and pays for the transport costs; therefore, the unit price of the products received at the depots

essentially reflects the cost of the products on arrival at Kinshasa—that is, the cost, insurance, and freight (CIF) price.[2] For the recently procured S/P, the unit cost for each tablet would be approximately USD 0.020 (USD 32,575 ÷ 1,609,000 ÷ 1,000). SANRU plans to continue managing the transportation logistics and paying for cost for delivery to the regional depots for the life of the project.

Inventory Management

SANRU is developing a Microsoft Access®–based inventory management software for use in its regional depots and HGRs. This software will include a stock management module and a multilanguage, multiservice, cost-center–based financial tracking module. Preliminary versions of this software are currently in use in the central warehouse and the regional depots, and it is anticipated that, once fully functional, this software will improve the inventory management capacity at these facilities.

Financing

In order to develop a sustainable pharmaceutical supply system, SANRU recently revised its cost-recovery system for the products it supplies through the regional depots for distribution to the SANRU-supported health zones. Each year, SANRU plans to provide drugs and other commodities to the regional depots, of approximately USD 3,000–15,000 in value, for sale to health facilities in each of the health zones it supports. The depot would then open a line of credit for each HGR and each BCZS less 10 percent of the value of the drugs (the regional depot applies a 10 percent margin on the sales as illustrated in Figure 1). Table 4 illustrates this process using a hypothetical HGR and BCZS. These lines of credit are essentially a donation to the health zones; SANRU does not expect to be repaid.

Table 4. Example of the Financing Mechanism for SANRU-Subsidized Drugs at the Regional Depots

	HGR (USD)	BCZS (USD)	Total (USD)
Value of pharmaceuticals	5,000	10,000	15,000
Annual line of credit at depot	4,500	9,000	13,500
Margin (retained profit at depot)	500	1,000	1,500

The annual line of credit for each HGR and BCZS will be determined by SANRU based on the individual consumption patterns. The HGR and BCZS are also free to make purchases in excess of this line of credit but must use their own resources to do so. One expected source of additional funds that the HGR and the BCZS can use to purchase products is obtained by recycling part of the income generated through the sale of the donated products.

For the BCZSs, SANRU requires that they resell the drugs and supplies they purchase at cost to the health centers, using the line of credit at the regional depot. That is, there should be no profit

[2] Cost, insurance, and freight includes the insurance and transport charges up to the port of destination.

margin added, as illustrated in Figure 1. Ten percent of the income generated from these sales is then retained by the BCZS to support its operational costs. The remaining 90 percent of the income is then available to be used for purchasing additional drugs and pharmaceuticals in excess of its line of credit.

Table 5 illustrates the proposed impact if the hypothetical BCZS in Table 4 purchased drugs worth USD 1,000 in the first month using part of its line of credit, and if it then sold all these drugs to the health centers in the same month. Of the USD 1,000 the BCZS received from selling these products at cost to the health centers, USD 900 would be available for the BCZS to use to purchase additional stock at the regional depot in excess of its remaining line of credit, or to purchase stock at other depots or from private sector vendors. Assuming that, in the second month, the BCZS uses the USD 900 to make additional purchases and sells these all these purchases to the health centers, it would then have USD 810 at the end of the second month to make purchases in the third month. If this recycling process is continued, at the end of 12 months, the original USD 1,000 line of credit will have generated sales of USD 7,175.70, the BCZS will have retained USD 717.57 to support its operating costs, and it will still have cash or stock worth USD 282 to apply toward the requirements for the next year. Using the full line of credit over the year would theoretically have a greater multiplicative effect.

Table 5. Income Generated by a BCZS through Sales of Goods Purchased Using USD 1,000 of the Line of Credit Provided by SANRU at the Depot

BCZS	Month 1 (USD)	Month 2 (USD)	Month 12 (USD)	Total (12 months) (USD)
Value of drugs received and sold	**1,000**	900	314	7,175.70
Retained income for operational costs (10%)	100	90	31	717.57
Value income recycled for purchases (90%)	900	810	282	6,458.13

For the HGR and the health centers, SANRU policy requires that 20 percent of the pharmaceuticals purchased using the line of credit be reserved for the indigent. The remaining products may then be sold to the rest of the population with an addition of a 20 percent margin. Twenty percent of the income derived from the sales is retained by the health facility to support its operating costs, while the remaining 80 percent is used to by additional stock in excess of its remaining line of credit. The following example and Table 6 provide an illustration. This example assumes that the hypothetical HGR in Table 4 decided to use its USD 4,500 annual line of credit evenly throughout the year and it illustrates the impact of the USD 375 used in the first month—

Monthly line of credit		= USD 375
Value of products reserved for the indigent	USD 375 x 0.20	= USD 75
Value of products available for sale to patients		= USD 300
Income from first month sales	USD 300 x 1.20	= USD 360

Table 6. Income Generated by an HGR through Sales of Goods Purchased Using USD 375 of the Line of Credit Provided by SANRU

HGR	Month 1 (USD)	Month 2 (USD)	Month 12 (USD)	Total (12 months) (USD)
Value of drugs sold[a]	**360**	345.60	230	**3,485.61**
Retained income for operational costs (20% margin)	72	69	46	**697.12**
Value income recycled for purchases (80% margin)	288	276	**182**	**2,788.49**

[a] Includes a 20 percent profit margin added to the recycled value, therefore, in the second month, USD 288 x 1.20 = USD 345.60

If the recycling process is continued, at the end of 12 months, the original USD 375 line of credit would have generated sales of USD 3,485.61, the HGR would have retained USD 697.12 to support its operating costs, and it would still have cash or stock worth USD 182 to apply toward the requirements for the next year. Using the full line of credit over the year would theoretically have a greater multiplicative effect.

Although this financing scheme has the potential to develop a sustainable drug supply system, some potential challenges to its success remain. These include the following questions—

1. Does the local population have the financial capacity to purchase the drugs? Local purchasing power will affect the cost-recovery process at the health facilities and will determine the capacity of the health facilities to use their lines of credit and to build the capital as planned.

2. What is the financial management capacity? Is there the capacity at the local level, particularly in the health centers, to appropriately manage the finances and budgets, especially the anticipated rise in income that would be generated by using the credit lines as planned?

3. Who determines who is "indigent"? Given the general poverty of the country, would this classification be generalized or would it be determined by each health facility or health zone depending on the local situation?

4. Who determines what drugs to purchase? Personnel at the health centers will need to have drug management knowledge and skills, because they will be the primary decision makers as to which drugs to purchase, in what quantities, and when to make the purchases.

The analysis of the system in Kabondo Health Zone provides an illustration of how some of these challenges are being addressed and where some gaps remain.

SECTION 3. DEPHAKIS

The central pharmaceutical store in Kisangani, DEPHAKIS, is the newest regional depot in the SANRU pharmaceutical supply system and has only been functioning since November 2003. In contrast to the other depots supported by SANRU, this depot was not based on any preexisting infrastructure. The main competitors in the Kisangani area are a depot owned and managed by the Catholic Church and several privately owned depots found mainly within the city. Before the establishment of DEPHAKIS, the health centers in the SANRU-supported health zones relied on the essential drug kits that SANRU provided and distributed directly to them.

DEPHAKIS was formed by a coalition of churches affiliated with the ECC. SANRU provides the technical and financial support to help it develop into a self-sustaining pharmaceutical supply store, while the coalition of churches retains the responsibility for its management. DEPHAKIS is currently run by one pharmacist, who has overall responsibility for its functions, and an administrator, who is in charge of inventory tracking and monitoring the finances of the store. There is also a guard who provides security for the warehouse.

DEPHAKIS Pharmaceutical Supply System

Procurement

SANRU plans to deliver essential medicines and supplies valued at USD 75,000 to DEPHAKIS during its first year of operations. The first part of the delivery from SANRU, valued at USD 25,000, was received at the end of November 2003. SANRU expects a 50 percent reimbursement from DEPHAKIS for this delivery, which will be paid over the next year. (DEPHAKIS had repaid USD 4,000 as of May 2004) The pharmaceuticals supplied are from a list of essential medicines and supplies developed by SANRU and consistent with the national essential medicines list (EML).[3] All the drugs procured are generics and are sourced primarily from IDA. The antimalarials included in this initial delivery were quinine and S/P, and the quantities supplied are listed in Table 7 (the complete list of products is included in Annex 3). The second delivery, valued at approximately USD 47,000, will occur during the next few months (the exact delivery date has not yet been determined). This delivery will support the development of the lines of credit for the SANRU-supported health zones, as discussed in the previous section. In the first quarter of this year, SANRU also procured and directly delivered to health facilities additional stocks of S/P for use in IPT.

Table 7. Antimalarials Included in Initial SANRU Donation to DEPHAKIS

Antimalarial	Unit	Quantity	Expiration
Quinine inj. 300 mg/ml, 2.5 ml ampoule	100 ampoules	54 packs	Jan. 31, 2007
Sulfadoxine/pyrimethamine 500 mg/25 mg	1,000 tablets	90 boxes	March 31, 2006

[3] The DRC EML was first developed in 1987 and has been revised twice, in 1991 and 2001. This latest edition, however, has not been formally adopted and has not been disseminated.

In the absence of consumption data, the quantities used in these initial procurements were based on the population figures and the estimated morbidity burdens. Officials from the health zones, including the Chief Medical Officer for each health zone, worked with SANRU to complete this initial quantification.

DEPHAKIS has not developed its own procurement plan or system and other than the anticipated delivery from SANRU, there are currently no planned procurements for the rest of 2004. The regional depot currently lacks the capacity to conduct its own international procurements and will continue to rely on SANRU to perform this function. The distance from Kinshasa and the absence of a reliable road network between Kinshasa and Kisangani means that all the pharmaceuticals procured through Kinshasa (international or local procurements) must be delivered to Kisangani by air transport. Organizing and paying for the cost of this transportation is also beyond the capacity of DEPHAKIS at this time, and there continues to be a need for SANRU to manage this.

There is very little sharing of information between DEPHAKIS and its main clients, the BCZSs and the HGR. Because DEPHAKIS has no access to the morbidity and mortality statistics that are compiled at the BCZSs and no access to any information on the drug consumption trends, stock levels, or projected future purchases by the BCZSs or the HGR, it is not able to anticipate the potential demand for its supplies and plan appropriately.

Distribution

As illustrated in Figure 1, the supply chain from DEPHAKIS to the peripheral health facilities follows a "pull" system. DEPHAKIS therefore has no distribution or transport plan and does not own any vehicles. The clients must come to the depot to purchase their drugs and need to make their own transport arrangements to ensure delivery of their purchases to their locations. The distances to the health zones and the travel constraints, as illustrated in Table 1, make transportation a potential barrier in the drug supply chain, and proper procurement planning is needed to make each procurement trip as cost-effective as possible. In the first five months of operation, the Yakusu BCZS made four visits to DEPHAKIS, the Opala BCZS and the Isangi BCZS each made three visits, and the Kabondo BCZS made at least five visits. Except for the Yakusu HGR, which has not made any purchases at the depot, the other HGRs have made at least one visit. These purchases were mainly small quantities that could be transported using commercial services (mainly motorcycles, bicycles, and canoes). When larger quantities need to be delivered, the SANRU regional coordinating office in Kisangani currently organizes the transport logistics and subsidizes the costs.

Communication

At present, there is no telephone (land line) or e-mail access at DEPHAKIS. Direct communication with SANRU officials at Kinshasa occurs via cell phone or personal e-mail. Cell phones are used to communicate with the Kisangani SANRU coordinating office, through which DEPHAKIS can also communicate with Kinshasa and the health zone offices. Communication with the Yakusu and Kabondo HRGs is done by cell phone. There is no cell phone access

beyond Yakusu. To improve communication, SANRU has supplied a two-way radio to each health zone office.

Storage

The DEPHAKIS warehouse has an approximate capacity of 300 cubic meters, and is located within a privately managed compound that also contains residential units. The warehouse was donated by one of the partners that established DEPHAKIS, and most of the residents in the compound are affiliated with the church. The main gate into the compound is not locked, but DEPHAKIS has hired a security officer to guard the store. There are two sets of doors leading into the actual storage area of the warehouse. The first set consists of an outer metal door and an inner wooden door with double locks. These doors open into the delivery/receiving area and the office. The administrator keeps the keys for this set of doors and is responsible for opening and closing them each morning. The second set of doors leads into the actual storage area. The depot pharmacist keeps this key, and this storage area can only be opened when he is present.Officially, clients are not allowed into the storage area. There was an additional door that opened directly from the storage area to the outside, but this is permanently closed and there are plans to seal it off completely. There is no alarm system, and there has been no loss of pharmaceuticals due to theft.

The storage area is clean, well maintained, and has adequate lighting. The medicines and supplies are all stored on shelves and pallets, which are sufficient to meet the current needs. Less than 25 percent of the storage area is currently in use; therefor, there is sufficient space for the additional supplies that will be arriving in the next few months. There will, however, be a need for additional shelving and pallets to store these additional supplies. There is electricity, but the supply is irregular, with a fluctuating current. The warehouse has a refrigerator, but this is currently not in use because of the fluctuations in the electric current. There is no generator to back up the electric supply.

The main problem with the storage conditions is ventilation and temperature control. The storage area has a bank of ceiling-level windows along one wall that are only closed off with wire mesh and bars. Because Kisangani is located in an equatorial rain forest environment, high temperatures and high humidity are the norm, and effective air-conditioning is essential to maintaining appropriate temperatures. The depot relies on ceiling fans to cool the storage area but, because no temperature tracking is performed, it is not clear how effective this method has been. At the time of the visit to the depot, these fans had broken down three days earlier. The temperature inside the storage area was 34˚C (90˚F)[4] at the time of the visit (2:30 P.M.) and it was extremely humid in the warehouse. This temperature is higher than appropriate for the proper storage of most pharmaceuticals. Subsequently, SANRU took steps to procure and install an air-conditioning unit at the depot.

[4] Unless specified, normal storage conditions are “dry, well ventilated premises at a temperature of +15˚C to +25˚C” (up to +30˚C depending on the climate conditions) (Management Sciences for Health and World Health Organization 1997, p.348).

Inventory Management

DEPHAKIS uses the computerized inventory management software that SANRU has developed to track the movement of stock it receives and sells. Bin cards are used in the storage area to keep track of the movement of each drug. The information from these bin cards is then entered into the inventory management software. For S/P and quinine, there was no inconsistency between the inventory quantities registered in the computer ledger and in the bin cards. There were no sales of S/P over the five-month period, and this was reflected in both ledgers. Twenty-two packs of quinine were sold in the same period, with 32 packs remaining in the inventory (Table 6 shows the initial stock levels). A physical inventory of the two antimalarials confirmed the accuracy of the records.

There has been no determination of appropriate minimum, maximum, emergency, or buffer stock levels for any of the products in the depot, including the antimalarials. Identifying and setting these levels is crucial for appropriate procurement, in order to prevent stock-outs or the accumulation of excess stocks, which may lead to expiration and wastage. There is no system in place for managing drugs and supplies that are about to expire or for managing the disposal of expired drugs and supplies.

Financing

DEPHAKIS currently relies almost entirely on the pharmaceuticals supplied through SANRU for its income. In the first five months of 2004, it sold products worth USD 6,467 to the SANRU-supported health zones (Figure 2), which means a profit of USD 646.70, assuming a 10 percent margin.

All four BCZSs and three of the four HGRs have purchased some products. (Yakusu HGR has received donations of pharmaceutical products from other church partners and therefore has not had to make any purchases.) Eighty-five percent of the sales have been to the BCZSs and 15 percent to the HGRs. The total monthly sales ranged from USD 548 to USD 2,964, with a monthly median of USD 575. Of the two antimalarials in stock, there were no sales of S/P. Twenty-two packs of quinine were sold, and 32 packs remain (see Table 7 for initial stock levels of the antimalarials). Of the drugs included in the initial supply, only paracetamol has been sold out and it has been out of stock since February 2004.

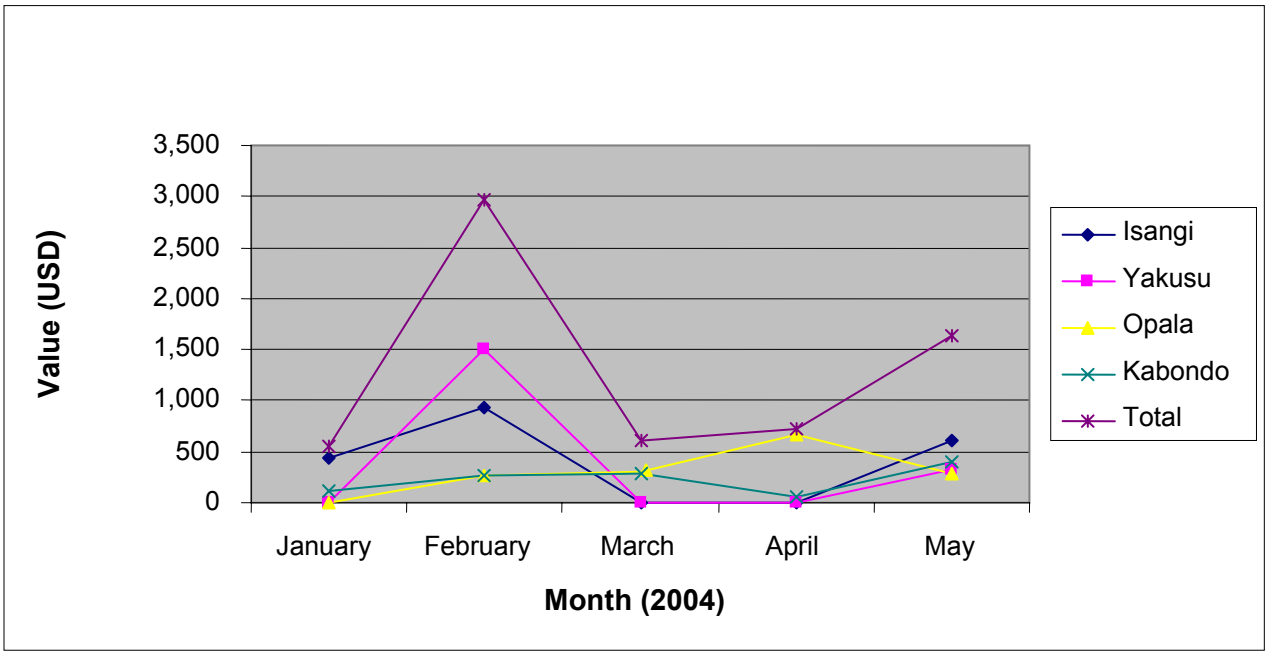


Figure 2. Value of health zone purchases at DEPHAKIS between January and May 2004.

All the sales at DEPHAKIS to date have been cash based, and therefore the health zones have been limited to buying only what their cash reserves will allow. DEPHAKIS has also been unable to make additional purchases to supplement its initial supplies, because it, too, has not built up any cash reserves. The lines of credit that SANRU plans to establish at DEPHAKIS for the health facilities would theoretically help to address this problem by allowing the health zones to make purchases at DEPHAKIS while they build up their cash reserves for long-term sustainability of the supply chain.

Table 8. Provisional Lines of Credit at DEPHAKIS for the Four SANRU-Supported Health Zones in Orientale Province (May 2004)

	Isangi (USD)	Kabondo (USD)	Yakusu (USD)	Opala (USD)	Total (USD)
BCZS line of credit	7,433.00	10,777.00	9,382.00	4,448.00	32,040.00
HGR line of credit	3,045.00	3,000.00	2,500.00	1,100.00	9,645.00
Total line of credit	10,478.00	13,777.00	11,882.00	5,548.00	41,685.00
DEPHAKIS revenue (10% margin)	11,525.80	15,154.70	13,070.20	6,102.80	45,853.50
DEPHAKIS profit from sales	1,047.80	1,377.70	1,188.20	554.80	4,168.50

The provisional lines of credit for each of the four health zones that DEPHAKIS serves are listed in Table 8. If each health zone used its full line of credit, DEPHAKIS would earn a profit from the revenue generated by the sales of approximately USD 4,170 for the year. This figure, however, does not include the impact of the health zones' making purchases using the income

that they would generate through the cost-recovery process. As explained in the previous section, SANRU requires that the health zones use 80 percent of the revenue generated through the sales of the products they purchase using these lines of credit to make additional purchases, preferably at DEPHAKIS.

SECTION 4. DRUG MANAGEMENT SYSTEM IN KABONDO HEALTH ZONE

Central Office of Kabondo Health Zone

The Kabondo BCZS serves 23 health centers, with a target population that was estimated at 199,949 in 2003. The MOH is currently subdividing this health zone as part of its health system reorganization. The CMO supervises and coordinates all the clinical and pharmaceutical management–related activities within the health zone. The CMO receives morbidity and mortality statistics monthly from all the health facilities in the health zone and is responsible for collating the data for planning health activities in the zone. Malaria has been the primary cause of outpatient attendance in the health facilities in the health zones.

In the first quarter of 2004, the health facilities in the Kabondo Health Zone managed 5,241 cases of malaria (see Table 9). Fifty-two percent of these cases were in children under five. In the same period, 238 women received a dose of S/P for IPT at hospitals within the health zone, and 1,378 women received a dose of S/P for IPT in the health centers within the health zone (20 women seen at the health centers came from outside the health facility catchment populations). In the first quarter, the total number of women who received S/P for IPT in the health zone was 1,616. IPT uptake was estimated at 40 percent of the pregnant women.[5]

Table 9. Cases of Malaria Managed at Health Facilities in Kabondo Health Zone in the First Quarter of 2004

Cases	Simple Malaria	Severe Malaria	Total Malaria
<5 years	2,212	526	2,738
>5 years	1,781	722	2,503
Total	**3,993**	**1,248**	**5,241**

Procurement

In November 2003, the BCZS-K received a seed stock from SANRU of all the essential drugs and supplies and, in the first few months of 2004, received a supply of S/P for distribution to health facilities for use in IPT. The S/P for IPT is supposed to be provided free to the pregnant women at the health facilities, but all the other essential drugs and supplies are part of the cost-recovery drug supply process. Replenishment of the stocks of essential pharmaceuticals takes place primarily at DEPHAKIS. Purchases at DEPHAKIS are made monthly.

Currently, there is no procurement plan for the BCZS-K and no clear procedures in place. There is a pharmacist who is responsible for the management of the BCZS-K warehouse. The pharmacist keeps track of consumption of the products in the warehouse, and the plan is to use these consumption data for future procurements. The pharmacist is also responsible for determining the quantities of each drug included in the monthly purchase at DEPHAKIS. At

[5] These statistics are from the records maintained at BCZS-K. Verifying their accuracy was outside the scope of this assessment.

present, it is not clear what process is being used to determine the quantities of each product to purchase, though it appears to be targeted at maintaining the initial stock levels rather than meeting identified needs. There are no safety minimum, or maximum stock levels determined for any of the products. The BCZS-K has no data on the stock levels of the essential pharmaceuticals in any of the health facilities it manages; nor does it have data on drug consumption for any of these facilities, because this is not part of the data it regularly collects from the health facilities. In addition, there is no systematic use of the morbidity statistics that the BCZS-K does collect monthly to plan for future procurements.

Monthly purchase of drugs and supplies by the BCZS-K is valued at approximately USD 300. Within this budget, the prioritization of needs is made by a committee consisting of the pharmacist, the CMO of the BCZS-K, and the BCZS-K administrator, though there is no formal process for conducting prioritization. The Kabondo BCZS has not purchased any antimalarial drugs because it still has sufficient quantities in stock. The CMO provides the final authorization for all the pharmaceutical purchases for the zone. The BCZS of Kabondo has approximately USD 1,400 that it has generated from sales to the health centers under a previous financing plan. This amount is currently held as a line of credit at the local SANRU coordinating office and is available for the purchase of additional pharmaceutical supplies. It is not clear, however, what percentage of this sum represents money that is to be used for purchasing additional pharmaceuticals and what percentage is for operating costs.

Theoretically, the BCZSs are not obligated to purchase all their pharmaceuticals from DEPHAKIS, but purchases outside of DEPHAKIS rarely occur. Should there be an urgent need, such purchases would be made by the SANRU coordinating office after consolidating the requirements for the BCZSs in the region. The CMO of the BCZS-K believes that DEPHAKIS is more expensive than some of the private depots in Kisangani and would like to make purchases from the private sector, but he is constrained by the lack of funds to do so. He is, however, unsure if the products from the private sector would be of the same quality as the products from DEPHAKIS, and the BCZS-K does not have the capacity to test the quality of products purchased.

The BCZS administrator and pharmacist use public transport, mainly bicycles and motorcycles, to travel to DEPHAKIS to make the purchases. For large purchases, the SANRU coordinating office organizes and pays for the transport and other logistics.

Distribution

The BCZS-K supplies all 23 health centers in the health zone. The health centers must make their own transport arrangements, and their staff must travel to the BCZS-K to make purchases (as illustrated in Figure 1). The BCZS-K does not maintain any vehicles for use in distribution. The type and quantities of the items procured by the health facilities depend on each facility's needs and individual cash-flow position. Health center purchases depend on the facility need and its finances. All purchases are cash based, and a strict no-credit policy prevails. (This policy was introduced when it became evident that the health centers were not paying the debts that they incurred at the BCZS-K when they made purchases on credit.)

Storage

The BCZS-K has a small warehouse at its main offices and has use of a storage room at the Kabondo HGR when additional storage capacity is needed. The BCZS-K warehouse has poor ventilation, there is no air-conditioning, and floor fans are used to improve the ventilation. The warehouse has sufficient shelves and pallets, and all the products are stored on these shelves and pallets. The lighting was poor and the lights were not functioning at the time of the assessment. The warehouse also has a refrigerator, which runs on solar power. None of the other electricity-dependent items at the BCZS use this solar power.

Inventory Management

The BCZS-K uses bin cards to record inventory and monitor the movement of stock. Information from these bin cards is transferred to a manual register, which is maintained by the pharmacist. This register is updated daily, and at the time of the visit there were no inconsistencies between the information maintained in the register and the information in the bin cards.

There were sales of S/P to some of the health centers in the health zone in the first quarter of 2004. The median purchase at each visit was 500 tablets, and some purchases were as low as 100 tablets. These amounts pose a problem for the BCZS, because the S/P comes in bottles of 1,000 tablets; therefore the smaller purchases require that the BCZS repack the S/P into the smaller units that the health centers prefer. The BCZS does not have standardized repackaging materials and relies on recycling used containers. There is no manufacturing station in the warehouse. At the time of the visit, there were 1,350 tablets of S/P left in the warehouse. The absence of information both on the rate of consumption of S/P at the health centers and on their current stock levels means that the BCZS is not sure how many months' need of S/P this stock represents.

The BCZS-K has no official policy for the management of expired drugs. Currently, expired drugs are expected to be held until the Regional Pharmacy Inspector visits the BCZSK and inspects them. The expired drugs are then are burned under supervision of the pharmacy inspector, though it is not clear where this would occur as there is no incinerator in the facility.

General Referral Hospital

The Kabondo HGR is a mission hospital that functions as the main referral facility for the health zone, and as such it does not manage many cases of outpatient malaria. It has an antenatal care unit and it provides IPT for pregnant women at this unit. The HGR has three pharmacies. The central pharmacy coordinates the pharmacy services at the hospital. Its responsibilities include procurement of medicines and supplies for the hospital. It supplies the regular pharmaceutical requirements to the other pharmacies at the hospital and dispenses medicines directly to the ward for use by inpatients. The retail pharmacy at the hospital dispenses medicines to outpatients and those discharged from the wards. There is also a special pharmacy that operates only at night to provide medicines needed for emergency inpatient care.

The hospital uses a cost-recovery financing mechanism to fund its operations. The charges for a patient with malaria are—

- Consultation fee: franc congolaise (FC) 200
- Laboratory fee: FC 400
- S/P: FC 50 per dose

Procurement

The key driving principle that the HGR uses in making purchases is the cost. Ideally, the HGR will purchase a product where it is the cheapest, provided the quality is assured, and preference is given to generic formulations. The HGR makes most of its pharmaceutical purchases at a depot run by the Catholic Church. The HGR has a credit line with this depot and therefore does not need cash to make purchases. Currently, the value of this credit line is euro (EUR) 1,000. Including this credit line, the Kabondo HGR has an overall monthly budget for pharmaceutical purchases of approximately EUR 1,500. Approximately 85 percent of this budget is used to purchase all the drugs, while the remaining 15 percent is used to purchase other medical supplies. The additional EUR 500 represents the monthly cash flow available for pharmaceutical purchases from DEPHAKIS and private depots. Until now, the purchases from DEPHAKIS have been limited by the cash-only system that was in place, and it is expected that the introduction of a credit line at DEPHAKIS will increase the purchases there. The hospital administrator and Sister-in-charge of the pharmacy would like to increase the purchases from DEPHAKIS, because its prices for most of the pharmaceuticals are lower than those of the pharmacy's current suppliers.

Procurement takes place each month following an audit of the inventory. The hospital has its own list of essential medicines, including antimalarials, which it uses to prioritize its purchases. The quantity of each drug to be purchased is based on the consumption of the drug, the stock remaining in inventory, and the available budget for drug purchases. The Sister-in-charge of the pharmacy determines what quantities of each drug to purchase, and the hospital administrator authorizes the purchases. The hospital has an ambulance that is also used for transport of purchased pharmaceuticals. The pharmacy Sister-in-charge makes all the purchases at the depots and accompanies all the purchased products back to the hospital.

The HGR uses approximately 625 tablets of S/P a month for case management of malaria and approximately 1,000 tablets every six months for IPT for pregnant women. The last delivery of S/P was in November 2003. There were 15,000 tablets (expiration March 2006) remaining in the HGR stores at the time of the assessment. At the current consumption rates, this amount represents approximately 18.9 months of the required S/P needs for the facility. There are no plans to purchase any additional stocks of S/P at this time.

In 2003, the average consumption of quinine 300 mg tablets was 1,305 tablets per month. The HGR estimates that it will continue to use approximately 1,000 tablets each month. They were 3,000 tablets in stock at the time of the assessment, representing approximately a three-month supply. The HGR estimates that it uses 400–600 500 mg tablets of quinine each month. There were 400 tablets left in stock at the time of the assessment, which is equal to approximately one

month's supply. Between 200 and 340 ampoules of injectable quinine are consumed each month. The 360 ampoules that were in stock at the time of the assessment represented approximately one month's requirement.

Storage

The main store at the central pharmacy of the HGR has a capacity of approximately 125 cubic meters. The store is clean and well ventilated. An air-conditioning unit is used to maintain the temperature in the storage area within the acceptable range. All the products were on shelves or pallets. A designated section within the storage area holds any expired products. The HGR also has additional room adjacent to the main store that is used to supplement the storage capacity and that is also used as a supplementary store by the Kabondo BCZS.

Inventory Management

Each of the pharmacies at the HGR maintains its own manual stock ledger. The daily consumption data are available from the ledgers at the retail pharmacy and the emergency pharmacy. Bin cards are used to track movement of drugs and supplies within the warehouse, and the information from these bin cards is entered in the manual stock ledger maintained in the central pharmacy. There was generally good record keeping at all the pharmacies in the Kabondo HGR, and there was no inconsistency seen in the stock levels recorded in the bin cards and the manual ledger.

The hospital receives drug donations, particularly from religious organizations and other NGOs. The hospital policy is to accept all donations irrespective of their expiry dates, which occasionally poses a problem if the products donated have a short shelf life. All expired items are registered and stored in a designated area in the warehouse. At the time of the assessment, there were some expired products in the warehouse, none of which were antimalarial products or supplies. The expired products are burned in the hospital incinerator at the end of each year, after a review by the regional pharmacy inspector.

Wanie-Rakula Health Center

The Wanie-Rakula Health Center is located approximately 58 km from the BCZS-K and in 2003 served a target population of approximately 8,579. The facility is open five days each week and sees six to eight patients per day. Approximately 50 percent of the patients seen are diagnosed with malaria. The facility has four staff members: the chief nurse or Infirmier Chef du Post (ICP), two other "nurses," (it was not clear if they were registered nurses or nursing assistants) and a finance assistant/administrator. The ICP has final authority over all the clinical and administrative decisions. He collects all the required data for the facility and forwards them to the BCZS.

Cost-recovery is also practiced at the health center level, though pregnant women do not pay for the S/P they receive for IPT. For case management of malaria patients, the facility charges are as follows—

- Consultation fee: FC 150
- S/P: FC 50 for dose
- Quinine: FC 5 per tablet; FC 50 for injection

Procurement

The ICP makes all the procurement decisions for the health center. He decides the type and quantities of each drug to be purchased, goes to the BCZS to make the purchases himself, and stores them in a cupboard in his office. Purchases at BCZS average once a month, and the ICP uses public transport—mainly a motorcycle or bicycle—to transport the purchases back to the health center. Procurement decisions are supposed to be based on consumption data, but the stock management ledger, which was provided by SANRU to record the daily consumption and stock levels within the facility, had not been used at the time of this assessment. The ICP was not at the health center at the time of the assessment, and in his absence there was no one who could explain the procedures he uses to make the purchase decisions for the health center.

Storage

There are two storage areas for pharmaceuticals at the health center. The cupboard in the ICP's office functions as the main storage area, and there is a second cupboard in the main examination room that is used to store the monthly requirements of the dispensary. The ICP is responsible for the cupboard in his office, and the administrator doubles as the storekeeper for the dispensary. Padlocks are used to lock both cupboards, and there has been no loss of products due to theft. The health center has no air-conditioning or fans.

Inventory Management

The health center finance assistant also functions as the dispensary storekeeper. He receives predetermined quantities of the drugs monthly from the ICP, but if the drugs run out before the end of the month he can obtain more. These drugs are stored in the cupboard in the examination room. Each day, the storekeeper issues to the dispenser the estimated drug requirements for that day. At the end of the day, the dispenser returns to him any remaining drugs. It is not evident how the storekeeper determines the daily requirements of each drug, because the health center does not maintain a record of the daily consumption of each drug.

At the end of the month, the storekeeper counts the number of drugs remaining in his store and subtracts this number from the quantity received at the beginning of the month to determine consumption for that month and estimate the additional requirements for the next month. He records the beginning balance, ending balance, estimated consumption, and additional requirements for all the drugs in his store on a loose sheet of paper torn from a writing pad. The storekeeper indicated that he has not used the stock ledger that was provided because he did not

understand how to use it. Table 10 lists the monthly consumption of S/P at the health center according to the records maintained for a six-month period.

Table 10. Monthly Consumption of S/P at Wanie-Rakula Health Center

Month	S/P Tablets Consumed
October 2003	58
November 2003	75
December 2003	43
January 2004	68
February 2004	50
March 2004	64
Average consumption per month	60

There are no procedures in place for determining the additional requirements for each drug in the dispensary store. For example, according to the records for March 2004, there were 164 tablets of S/P in the store at the beginning of the month and 64 tablets were consumed, leaving a balance of 100 tablets in the dispensary store. The consumption trends shown in Table 10 indicate that these 100 tablets were sufficient to meet the estimated needs for April; nevertheless, the storekeeper had requested an additional 50 tablets from the ICP to add to his store. There was no explanation for why these additional tablets were requested and why he decided that 50 additional tablets would meet the requirement. The monthly consumption as recorded combines the S/P needs for case management and for IPT. There is no separation of consumption based on the medical need. The health center received 1,000 tablets of S/P in November, and according to the consumption trends it has sufficient S/P to last another 9 months (until the end of 2004).

The drugs in the dispensary are stored in recycled containers; therefore, the expiration dates on the containers do not match the actual drug expiration dates. For example, the container for S/P in the dispensary store indicated that the S/P expires in June 2004, but the main container in the ICP's store from which the S/P was issued listed the expiration date as March 2006. The storekeeper does not keep track of the expiration dates of the drugs in his store. In the absence of the ICP, we were unable to determine if he monitors the expiration dates of the drugs in the facility. We were also unable to determine the inventory management procedures and practices he uses for the drugs stored in his office and what he expects of the practices in the dispensary store.

Rational Use: Prescribing Practices

SANRU has developed standard treatment guidelines (STGs) that include guidelines for the management of malaria, and it has distributed them to the health facilities in its health zones. The latest edition of these STGs was published in 2001. A copy was seen at the health center. There were also posters outlining recommended guidelines for case management of malaria and for IPT, developed in collaboration with the Ministry of Health, on the walls in both examination rooms.

Intermittent Preventive Treatment

For IPT, the guidelines indicate that the first dose of S/P should be given 16 weeks after gestation, with the first movement of the fetus, and the second dose of S/P should be given one month later. The actual practice at the health center follows these guidelines, though the health center staff reported that they do not give S/P to women in the last month of pregnancy, mainly because of a belief that S/P given this late would affect the newborn adversely. This perceived contraindication is not included in the guidelines.[6]

A register is maintained at the health center of all ANC patients seen at the facility. According to the information in this register, the majority of women seen at the health facility have received the required two doses of S/P, and all the women have received at least one dose. This register does not, however, indicate the gestational age at first presentation by the pregnant woman, though this information is collected and included in the ANC attendance card that is kept by the woman. It was, therefore, difficult to determine if there was true compliance with the treatment guidelines or if the women who received only one dose did so because they presented too late in the pregnancy to receive the second dose. We recommended that, for now, this information be included in the comments section of the register, and SANRU will make changes in the future versions of the register to allow for the collection of these data.

Case Management of Malaria

The recommended treatment doses, by age, for the case management of malaria are listed in Table 11. Diagnosis of malaria is made on the basis of clinical symptoms. There were no patients with malaria seen at the health center at the time of the assessment, so there was no direct observation of the prescriber practices at the facility. A brief review of the medical records indicated that the treatments prescribed for simple malaria are consistent with the guidelines.

Table 11. Recommended Treatment Doses for Case Management of Uncomplicated Malaria in the DRC

Age	S/P Tablets	Paracetamol 500 mg Tablet
3–11 months	.50	.33
1–2 years	.75	.50
3–5 years	1	.75
6–9 years	1.5	1
10–12 years	2	1.5
13–18 years	2.5	2
> 18 years	3	2

[6] The CMO, when asked, confirmed that he too believes that SP should not be given in the last month of pregnancy.

Rational Use: Dispensing Practices

One of the "nurses" functions as the dispenser. The dispensing area consists of a table set up on a veranda at the rear of the health center and screened by a reed mat. (This is common dispensing setup in most of the health centers, particularly in the less urban areas.) The dispenser uses empty drug containers to store the drugs issued by the storekeeper, and like the storekeeper, the dispenser does not know the expiry dates of the drugs he dispenses. SANRU has issued packages for dispensing drugs to the BCZS for sale to the health centers; however, these were not in use in this health center.

The dispenser stated that the practice at the health center is directly observed treatment (DOT) for S/P, prescribed for case management, and for IPT, and for the first dose of quinine. Because the health center has no running water, there was no water or cups at the dispensing area that would presumably be used for DOT. No patient was treated for malaria or given IPT at the health center at the time of the assessment, so the team was unable to observe whether DOT is the actual practice.

SECTION 5. FINDINGS AND RECOMMENDATIONS

This assessment has identified several strengths and some of the challenges that remain in developing a sustainable drug management system built around the Kisangani Regional Drug Depot. The limited scope of this assessment, however, means that the findings may not necessarily be representative of what is happening at all the health facilities within the Kabondo Health Zone, or in the other health zones that SANRU manages.

The use of consumption-based procurement through a regional drug depot is still new, and most of the health care personnel in the health zone are still learning how to procure, distribute, and manage the drugs to ensure that they are consistently available to the health facility clients. The pharmacy staff working at the Kabondo HGR are the exception, as they have been responsible for making these decisions before.

Based on observing the drug management system at the BCZS-K and at DEPHAKIS, it appears that there needs to be clarification of the roles of the two warehouses within the system so that the personnel at each of these facilities can more clearly understand their roles and how they fit into the system. The BCZS is a transit point for purchases for the facilities, and therefore, its stock levels should be more current.

Procurement and Distribution

Effective procurement procedures and practices are essential to sustain the planned drug supply system. Accurate quantification of future drug needs is a crucial part of the procurement process, and accurate quantification requires reliable information on morbidity patterns for the different diseases managed at the health facilities and on the consumption trends for each drug.

Key Findings

- SANRU has developed and provided ledgers for health facilities to use in collecting these data. It was evident during the assessment that, at each level of the health system, the health providers, who were already collecting some of the required statistics, did not understand how to use the information they were collecting to assist in their own procurement planning. Most of the data collected by the health facilities remain at the level of the BCZS and are not shared with DEPHAKIS, which is therefore unable to use this information for its own procurement and inventory management planning.

- There are no written procedures to standardize and guide the procurement planning and decision-making processes at DEPHAKIS, the BCZS, or the health facility level.

- Distribution of procured pharmaceuticals to DEPHAKIS and to the peripheral health facilities is the greatest challenge in developing a sustainable drug supply system. The absence of a reliable road network means that the only effective means of transport from Kinshasa to DEPHAKIS is by air. The absence of vehicles at DEPHAKIS and at most of the

peripheral facilities means a continued reliance on SANRU and the public transportation system to deliver the pharmaceuticals purchased.

- The revolving plan that SANRU has developed to finance the pharmaceutical supply system has the potential to develop a sustainable supply system; nevertheless, several potential challenges remain, most of which were not explored, as they were outside the scope of this assessment. These challenges include the financial management skills of health staff, particularly at peripheral health facilities, the purchasing power of the local populations, and the capacity of the health facilities to manage the additional pharmaceuticals that they would procure with this increased financial capability.

Recommendations

- Training of all the health providers, particularly in the health centers, is needed to make sure that they use the ledgers provided by SANRU and fill them in correctly. There is also a need to train the health providers on how to use the information that they collect to improve their procurement planning and guide them in making the purchasing decisions.

- There is a need to develop a system of making the information collected by the HGR and the BCZS available to DEPHAKIS on a regular basis.

- Standard operating procedures (SOPs) and guidelines should be developed for and disseminated to DEPHAKIS, the BCZS, the HGR, and the health centers for all areas of health commodity management.

- To ensure the security of pharmaceuticals delivered via public transportation (e.g., bicycles, motorcycles, and canoes), it may be useful to provide secure containers to store and protect them (from theft and from the elements) while in transit. For the immediate future, SANRU may need to continue managing the transportation between Kinshasa and Kisangani and the transportation of large purchases for the health facilities.

Storage

Appropriate storage conditions are essential in maintaining the quality of pharmaceuticals.

Key Findings

- All the stores visited were clean and well maintained, and they all had sufficient shelves and pallets to meet their current needs.

- Except for the Kabondo HGR, temperature control was the main challenge in all the stores. Temperature control is particularly important in Kisangani, which lies within an equatorial rain forest environment, where high heat and humidity occur most of the year.

- The irregular supply of electricity, particularly at DEPHAKIS, also presents a challenge, and this would need to be improved so that the refrigerator and air-conditioning unit purchased by SANRU can be used.

Recommendations

- SANRU has already purchased an air-conditioning unit for use at DEPHAKIS, but the problem of the irregular electric supply may still need to be addressed to ensure that this unit can be used on a regular basis.

Inventory Management

Key Findings

- DEPHAKIS, the BCZS, and the HGR all used bin cards and either a computerized (DEPHAKIS) or manual ledger to record the movement of the drugs in their facilities. All these records were well maintained.

- The staff at the health center were not using the ledger supplied by SANRU to record the movement of their drug stocks, primarily because they did not understand how to use it. Most of the information that should have been entered into this ledger was actually being collected and written on the loose sheets of paper that the staff preferred.

- None of the facilities visited is tracking how much S/P is used for IPT and how much is used for case management, though this is required. S/P used for IPT is supposed to be provided free, while S/P prescribed for case management is provided for a fee (with the exception of the indigent).

- Except for the Kabondo HGR, none of the facilities visited had developed a policy for handling soon-to-expire and expired drugs.

- There is a need to repackage S/P at the BCZS. Most of the health centers do not want, nor do they need, to purchase S/P in units of 1,000, which is the unit of measurement currently used.

Recommendations

- Health center staff need to be trained on the use of the stock ledgers provided and on how to use the information they collect in these ledgers to guide the drug management decision-making processes at the health center.

- Health facility staff need to maintain separate consumption data for the S/P used in IPT and S/P used in case management because these are technically considered to be separate conditions.

- SOPs are needed for the management of soon-to-expire or expired pharmaceuticals at all levels of the health system.

- Appropriate packaging materials should be available to the BCZS, in the event of a need to repackage the S/P to better meet the needs of the health centers.

Rational Use

Key Findings

- STGs, including guidelines for the case management of malaria, were available at the health center and were being followed.
- IPT is being practiced, though there appears to be a belief among the providers that S/P should not be given in the final month of pregnancy, so the dose is not administered then.
- S/P is supposed be given by DOT for both case management and IPT, but the apparent lack of safe drinking water may mean that this is not actually the practice.
- SANRU has provided dispensing packets that the health facilities are supposed to purchase from the BCZS to use when dispensing drugs for consumption at home. These were not available and were not being used at the health center visited.

Recommendations

- It may be useful to conduct an assessment of the health care providers in other health zones to find out if the belief that S/P is contraindicated in the final month of pregnancy is limited to providers in this health zone or is more widespread. This belief may result in many pregnant women failing to receive a dose of IPT when they should.
- The health providers may need to be retrained on the IPT guidelines to make sure they are prescribing it appropriately.
- The dispensing packages need to be made available to the health centers.

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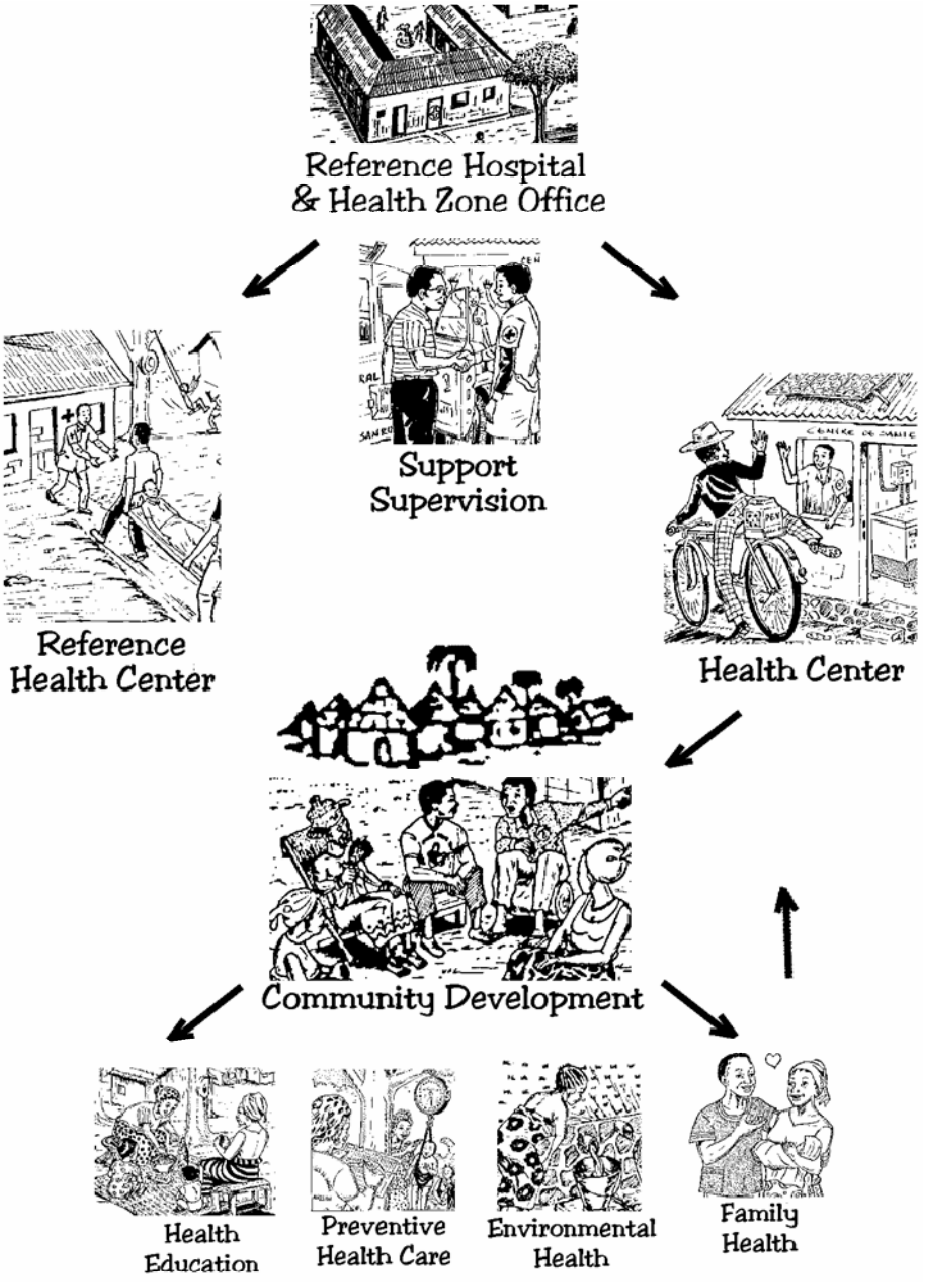
ANNEX 1. MAJOR "GLOBAL SUPPORT" PARTNERS FOR THE HEALTH ZONES IN THE DRC

Development Partner	No. Health Zones	Regions Where Active
SANRU	62	All regions
MEDAIR	23	Orientale Province
Memisa-B	20	Bandundu, Orientale Province, Equator
MSF-B	20	S. Equator, Katanga
Novib/ASRAMES	19	N. Kivu
CRS	17	Bas Congo, Kasai Occidental, Kasai Oriental
FOMETRO	12	Bas Congo, Bandundu, Maniema, Kasai Oriental
Solidarite Protestant (ECC)	12	Bas Congo, Bandundu, N. Equator; terminating 2002
Maltezer-D	10	Orientale Province, S. Kivu
Nuova fronteria	9	Kinshasa, N. Katanga, Kasai Occidental (Kananga)
ECC	8	Kinshasa, Kasai Occidental
Merlin	7	Kasai Oriental (Sankuru), Maniema
BDOM	6	Kinshasa, Equator, Bas Congo, Bandundu
COOPI	6	N. Equator, Kasai Oriental
Horizon Santé	6	Kinshasa, Bandundu

Source: Clemmer, B., L. Kintaudi, F. Minuku, L. Sthreshley, and P. Derstine. 2002. *Rebuilding Primary Health Care and Health Zones in DR Congo.* Presented at the American Public Health Alliance Annual Meeting, Philadelphia, Nov. 12, 2002. PowerPoint slides. <http://www.sanru.org/Rebuilding_PHC_and_health_zones_in_DRCongo.html.> (accessed Aug. 2, 2004).

ANNEX 2. COMPONENTS OF A HEALTH ZONE



ANNEX 3. INITIAL SEED STOCK DELIVERED TO DEPHAKIS IN NOVEMBER 2003

DRUG/ITEM	EXPIRATION	QUANTITY	UNITS
I. Antibiotics			
Penicillin G procaine 3 miu	12/31/2005	240 packs	50 vials
Gentamicin 40 mg/ml, 2 ml	11/30/2005	45 packs	100 ampoules
Benzylpenicillin 5 miu	12/31/2005	54 packs	50 vials
Ampicillin 1 gram inj.	12/31/2006	30 packs	50 vials
Co-trimoxazole 400 mg+80 mg	10/31/2006	250 boxes	1,000 tablets
Doxycycline 100 mg	11/30/2005	120 boxes	1,000 tablets
Chloramphenicol 250 mg	12/31/2005	90 boxes	1,000 capsules
Amoxicilline 250 mg	12/31/2006	84 boxes	1,000 tablets
II. Antimalarials			
Quinine inj. 300 mg/ml, 2.5 ml	01/31/2007	54 packs	100 ampoules
Sulfadoxine/pyrimethamine 500 mg/25 mg	03/31/2006	90 boxes	100 tablets
III. Analgesics			
Acetylsalicylic acid 500 mg	12/31/2005	428 boxes	1,000 tablets
Paracetamol 500 mg	11/30/2005	180 boxes	1,000 tablets
IV. Anthelmintics			
Mebendazole 100 mg	04/30/2006	90 boxes	1,000 tablets
Levamisole 50 mg or 150 mg	12/31/2005	18 boxes	1,000 tablets
Metronidazole 250 mg	11/30/2005	150 boxes	1,000 tablets
V. Anti-anemics			
Ferrous sulfate folic acid	03/31/2006	200 boxes	1,000 tablets
VI. Antihistamines			
Chlorphenamine 4 mg	05/31/2006	180 boxes	1,000 tablets
Prednisolone 5 mg	02/28/2008	54 boxes	1,000 tablets
VII. Antacids			
Aluminum carbonate 500 mg	01/31/2006	72 boxes	1,000 tablets
VIII. Hydration agents			
Oral rehydration salts (ORS)	12/31/2005	72 packs	50 sachets
Sodium chloride 0.9% 500 mg	06/30/2005	30 cartons	20 liters
Dextrose 2.5% 100 ml +set	01/31/2007	49 cartons	12 liters
Dextrose 50% 50 ml inj.	01/31/2006	30 packs	20 vials
IX. Consumables			
Cetrimede 15% + chlorhexide gluconate 1.5%	10/31/2005	40 cans	5 liters
Water for injection 10 ml	12/31/2007	143 packs	100 ampoules
Needle 21 **gauge**	03/31/2008	144 boxes	100 count
Needle 23 gauge	03/31/2008	200 packs	100 count
Scalp vein infusion set 21 gauge	08/31/2007	30 packs	100 count
Scalp vein infusion set 23 gauge	08/31/2007	20 packs	100 count
Syringe 2 ml	02/28/2008	150 packs	100 count

DRUG/ITEM	EXPIRATION	QUANTITY	UNITS
Syringe 5 ml	02/28/2008	100 packs	100 count
Syringe 10 ml	03/31/2008	100 packs	100 count
Gauze compress 10 x 10 cm 12 pynon sterile		100 packs	100 count
Latex examination gloves, medium	02/28/2008	100 packs	100 count
Surgical gloves, 7.5 sterile	01/31/2008	100 packs	50 pairs
Sparadrap 2,50 x 5 m		120 packs	8 rolls
CPD-a bag 63 ml pr450 ml blod+set	05/31/2005	195 packs	10 count
Transfusion kit			2,000 count
Hydrophilic strip	08/31/2004	120 packs	50 rolls
X. SUPPLIES			
Thermometer		200 count	
XI. ANTIHYPERTENSIVES			
41 Methyldopa	02/28/2008	10 boxes	100 tablets