

Pharmaceutical Management of Antiretroviral Medicines in Guangxi Province, China: Report of SPS Visits to Treatment and Distribution Sites, December 2008

Helena Walkowiak
Sharri Hollist
Connie Osborne
Lan Zhang

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Strengthening Pharmaceutical Systems
Center for Pharmaceutical Management
Management Sciences for Health
4301 N. Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Phone: 703.524.6575
Fax: 703.524.7898
E-mail: sps@msh.org

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About SPS

The Strengthening Pharmaceutical Systems (SPS) Program strives to build capacity within developing countries to effectively manage all aspects of pharmaceutical systems and services. SPS focuses on improving governance in the pharmaceutical sector, strengthening pharmaceutical management systems and financing mechanisms, containing antimicrobial resistance, and enhancing access to and appropriate use of medicines.

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Key Words

Antiretroviral therapy, China, Guangxi Province, HIV/AIDS, pharmaceutical management

Strengthening Pharmaceutical Systems
Center for Pharmaceutical Management
Management Sciences for Health
4301 North Fairfax Drive, Suite 400
Arlington, VA 22203 USA
Telephone: 703.524.6575
Fax: 703.524.7898
E-mail: sps@msh.org
Web: www.msh.org/sps.org

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ACRONYMS

3TC	lamivudine
AZT	zidovudine
AIDS	acquired immune deficiency syndrome
ART	antiretroviral therapy
ARV	antiretroviral [medicines]
BOH	Bureau of Health [China]
CDC	Center for Disease Control and Prevention [China]
d4T	stavudine
ddI	didanosine
DoF	Department of Finance [China]
DoH	Department of Health [China]
EFV	efavirenz
FEFO	first expiry first out
HIV	human immunodeficiency virus
IDV	indinavir
LPV/r	lopinavir/ritonavir
MOH	Ministry of Health [China]
MSF	Médecins Sans Frontières
MSH	Management Sciences for Health
NCAIDS	National Center for AIDS/STD Control and Prevention
NVP	nevirapine
OI	opportunistic infection
PEP	post-exposure prophylaxis [of HIV]
PMTCT	prevention of mother-to-child-transmission [of HIV]
RDMA	Regional Development Mission/Asia [USAID]
RPM Plus	Rational Pharmaceutical Management Plus (Program) [MSH]
SOP	standard operating procedure
SPS	Strengthening Pharmaceutical Systems Program [MSH]
TDF	tenofovir
USAID	U. S. Agency for International Development
WHO	World Health Organization

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Special gratitude is offered to the provincial, city, and county CDC staff and staff from the antiretroviral therapy treatment centers for their tireless and exceptional cooperation during the visit.

- Guangxi Provincial CDC
- Guangxi Zhuang Autonomous Region Longtan Hospital
- Guilin City CDC
- Guilin The Third People's Hospital
- Heng County CDC
- Heng County People's Hospital
- Luzai County CDC
- Luzai County People's Hospital
- Liuzhou City CDC
- Nanning, The Fourth People's Hospital

EXECUTIVE SUMMARY

Management Sciences for Health's (MSH) Strengthening Pharmaceutical Systems (SPS) Program has received funding from the U.S. Agency for International Development's (USAID) Regional Development Mission/Asia (RDMA) to provide technical assistance to strengthen pharmaceutical management operations for the HIV program in China. SPS staff travelled to China from December 1 to 10, 2008, to review pharmaceutical management operations at antiretroviral therapy (ART) treatment and distribution sites in Guangxi Province and to work with stakeholders, including the World Health Organization (WHO), and the National Center for AIDS/STD Control and Prevention (NCAIDS) at the national level, and Guangxi Bureau of Health (BOH) and China Center for Disease Control and Prevention (CDC) managers, to develop an action plan for strengthening the antiretroviral (ARV) pharmaceutical management system in Guangxi Province.

The ART program in Guangxi Province is growing rapidly. By the end of 2008, the number of people on ART is expected to have doubled in one year from approximately 3,500 to 7,500 and by the end of 2009, the patient numbers are projected to double again to 15,000. ARV medicines are managed as a vertical program by Guangxi CDC together with HIV diagnostic, CD4, and viral load reagents, and infant milk substitutes. Medicines to prevent and treat opportunistic infections (OIs) and other ART-related medicines and laboratory reagents are managed as part of the essential medicines program by the BOH. Patients receive ARVs at 37 ART treatment centers located at provincial, city, and county-level facilities; three of the centers provide services for children. ARVs are stored and distributed at three levels of the health care system—the Provincial Store, city CDC stores, and county-level CDC stores. With three different operating levels, the supply system requires efficient inventory and storekeeping practices and an effective information tracking system to avoid overstocks and shortages of ARV medicines.

During the five-day visit, the SPS/WHO team visited five distribution and seven treatment sites at each system level, including two of the three centers in the province that provide ART services to children. Following the site visits, SPS met with stakeholders from Guangxi Province, NCAIDS, and WHO to present key findings and recommendations and to discuss activities that SPS could potentially support.

Key Findings

In general, many pharmaceutical management operations appear to be working well. The major concerns are summarized below.

- **Policies.** National regulations on HIV pharmaceutical management have been drafted and national guidance related to HIV pharmaceutical management is under preparation. Written standard operating procedures (SOPs) for managing ARVs and controlling inventories at each level are not available.

- **Selection.** Availability of second-line ARV products is currently very limited and several sites have patients either waiting for medicines or results of viral load and genotype testing.
- **Procurement.** ARVs are procured primarily by the Government of China with additional donations from the Clinton Foundation and GlaxoSmithKline. Suppliers are selected at the national level through an annual bidding process and Guangxi CDC orders medicines quarterly from these suppliers. However, no ARVs have been purchased by Guangxi province under the national bidding process in 2008 and persistent shortages of donated lamivudine (3TC) 300 mg tablets have further complicated supply management. Guangxi CDC has processed two emergency tenders to fill the gap but some ARVs have been in short supply at the Provincial Store for extended periods during 2008. No treatment interruptions have occurred for patients but provincial level staff members are on constant alert to manage shortages. Orders from lower levels often cannot be filled in full, increasing order frequency, staff time, and transport costs. To avoid stock-outs, sites issue smaller quantities to patients who must return more frequently to collect refills—this increases their transportation and, in some cases, accommodation costs.
- **Forecasting.** A bottom-up approach is used to prepare annual forecasts of need and to determine procurement quantities. There are no formal procedures for estimating needs, and the methods used by treatment centers and CDC stores, particularly for setting buffer stocks, are diverse. Simple tools to assist staff to analyze data and quantify needs are lacking. Developing assumptions about future use and rate of scale-up is difficult, particularly for annual forecasts as guideline changes are implemented. Data needed to develop assumptions is difficult to extract from existing data collection tools and often inaccurate or missing in reports from lower levels.
- **Distribution.** The Provincial Store will soon need more storage space and shelving as product volumes increase. Store temperatures are monitored regularly and recorded at most CDC stores but at only two of the treatment centers visited. One CDC store and one storage area and two dispensing areas at three of the treatment sites visited are not air-conditioned. Stores and treatment sites must collect deliveries from higher level stores and transportation costs are reported to be significant.
- **Use.** Tablet counters are unavailable and packing and labeling practices vary widely across treatment centers. Job aids or checklists to guide medication counseling are lacking. Procedures for monitoring and addressing adherence problems vary from center to center.
- **Pharmaceutical management information system.** Staff members report that there are too many forms and reports to complete and find it difficult to extract data for operations and reporting from existing data collection forms. Tools need to be streamlined, consolidated, and improved. Standardized and simple tools (both manual and electronic) are needed immediately to record inventory transactions at all levels and to capture issues data at the dispensing point. At high-volume sites, a database that can process data from

dispensing encounters and accurately and quickly generate information for reporting and for estimating forecasts and procurement quantities is a priority.

- **Program Management.** Supervisory visits to ART treatment centers and stores are largely ad hoc. Formal procedures and a supervision tool are lacking for CDC monitoring and audit visits. Indicators that can be used to monitor availability and the performance of pharmaceutical management operations are not routinely calculated or tracked. Funding to support ARV pharmaceutical management operations including data collection, forecasting needs, and reporting is lacking and staff are currently managing ARVs on a part-time basis. Staff members managing ARVs need training in pharmaceutical management and specifically in forecasting, including analyzing data.

Recommendations

Key recommendations include the following—

- Address the procurement delays at the national level as a priority and identify interim measures at the provincial level to resolve supply shortages. Establish a mechanism for communicating information on delays to the provinces early so that alternative procurement methods, such as the provincial bidding process, can be initiated in good time.
- Improve forecasting by strengthening and standardizing methods for analyzing data, developing assumptions and estimating needs, and by providing tools appropriate to each level. At the provincial level, establish a forecasting or planning working group to support the pharmacist tasked with preparing the annual forecasts, particularly in developing assumptions.
- Strengthen and standardize procedures for managing medicines and controlling inventories at each operating level. Develop and field-test written SOPs for key pharmacy operations including ordering, forecasting needs, inventory management, dispensing, information management, and reporting. Provide training in pharmaceutical management to support the implementation of tools and SOPs.
- Identify additional storage space and pallets or shelving at the Provincial Store. Introduce procedures and charts for monitoring temperatures and expiry dates in storage areas and dispensing points at all levels and especially at sites where ARVs are stored in areas that are not air-conditioned. Install or improve cooling systems as appropriate.
- Provide tablet counters and appropriate bags and supplies for labeling and packaging medicines. At the provincial level, strengthen and standardize medication counseling practices and procedures for monitoring adherence and addressing adherence problems.
- Streamline record keeping and reporting tools to facilitate data collection, analysis, and reporting, and improve information flow between each level. Institute steps to develop

and implement a database that can process data from dispensing encounters and accurately and quickly generate information for reporting and for estimating forecasts and procurement quantities for high-volume treatment centers. Such a tool will be essential as patient numbers increase.

- Develop a supervision tool and implement regular CDC monitoring and audit visits. Establish systems for quarterly reporting and tracking of key indicators for pharmaceutical management operations.
- Develop a budget and identify funding to cover transport costs and also to support ARV pharmaceutical management operations including data collection, forecasting needs, and reporting at all operational levels.
- Develop a standard minimum training package and ensure that all staff members responsible for managing and dispensing ARVs complete the training.

Action Plan and Next Steps

Activities that SPS could potentially support and agreed on in principle by stakeholders are set out below. SPS support is dependent on funding being available.

- Review of existing manual forms and tools to identify options to streamline, consolidate and fill gaps
- Development of SOPs including—
 - Drafting SOPs and related tools for review by stakeholders
 - Developing and delivering training on SOP implementation
 - Preparing procedures and a supervision tool for monitoring
 - Providing follow-up support
- Strengthening forecasting methods and developing tools to complement other partner efforts

Next steps were mapped out and the timeline for activities will be determined based on SPS and partner commitments.

BACKGROUND

Management Sciences for Health's (MSH) Strengthening Pharmaceutical Systems (SPS) Program has received funding from the U.S. Agency for International Development's (USAID) Regional Development Mission/Asia (RDMA) to provide technical assistance to strengthen pharmaceutical management operations for the HIV program in China. In May 2007, the Rational Pharmaceutical Management (RPM) Plus Program, the predecessor project to SPS, met with the World Health Organization (WHO), Beijing, and the National Center for AIDS/STD Control and Prevention (NCAIDS) to discuss possible RPM Plus support in developing standard operating procedures (SOPs) for pharmaceutical management of antiretroviral (ARV) medicines. Activities began in June 2007 when RPM Plus partnered with WHO and NCAIDS to conduct a preliminary study of pharmaceutical management operations for the antiretroviral therapy (ART) program in Yunnan Province.¹ As a follow-on to this survey, WHO and NCAIDS requested that the Strengthening Pharmaceutical Systems (SPS) Program, the follow on project to RPM Plus conduct a workshop in Guangxi Province to introduce a tool for assessing performance of ARV pharmaceutical operations. The workshop, held in Nanning in July 2008, also incorporated training in the principles of pharmaceutical management and good practices for a group of pharmaceutical managers, pharmacists, doctors, and other health care staff working in the HIV program in Guangxi Province.

Based on the recommendations resulting from the workshop and inputs from national stakeholders and senior managers from the provincial level Bureau of Health (BOH) and Chinese Center for Disease Control and Prevention (CDC), it was decided that SPS should travel to Guangxi Province to gather more information on ARV pharmaceutical management operations and work with stakeholders to develop a plan for pharmaceutical management strengthening activities, including potentially developing SOPs.

Purpose of Trip

Ms. Helena Walkowiak, SPS Senior Program Associate, and Ms. Sharri Hollist, SPS Program Associate, visited China from December 1 to 10, 2008, to review pharmaceutical management operations at ART treatment and distribution sites in Guangxi Province and to work with stakeholders, including WHO and NCAIDS at the national level and Guangxi BOH and CDC managers, to develop an action plan for strengthening the ARV pharmaceutical management system in Guangxi Province.

¹ Dias, Vimal S. 2007. *RPM Plus: Pharmaceutical Management of Antiretroviral Medicines in Yunnan Province, China, June 18-21, 2007: Trip Report*. Submitted to the U.S. Agency for International Development by the Rational Pharmaceutical Management Plus Program. Arlington, VA: Management Sciences for Health.

Scope of Work

The scope of work for this visit was to—

- Visit ART treatment and distribution sites in Guangxi Province to obtain a more complete understanding of the current situation of pharmaceutical management operations.
- Develop and present an action plan to national and provincial level stakeholders to strengthen existing ARV pharmaceutical management systems in Guangxi Province.
- Meet with national and provincial level stakeholders to discuss the action plan for ARV pharmaceutical management system strengthening, and prepare for execution, including implementing existing tools or developing new ones.

ART TREATMENT AND DISTRIBUTION SITE VISITS TO GUANGXI PROVINCE

Ms. Walkowiak and Ms. Hollist traveled to Guangxi Province December 2–8, 2008, to visit ART treatment and distribution sites to obtain a more complete understanding of the current situation of pharmaceutical management operations. The visits were undertaken in collaboration with WHO, Beijing; Guangxi BOH; and CDC. Dr. Connie Osborne, Senior Advisor of HIV/AIDS Care and Treatment, WHO, Dr. Zhang Lan, National Programme Officer HIV/AIDS, WHO, and Dr. Liu Shuaifeng, AIDS Division Guangxi, CDC, were closely involved in conducting the site visits in Guangxi Province and gathering information on pharmaceutical management operations.

Objectives of Site Visits

Objectives of the ART treatment and distribution sites visits in Guangxi Province were to—

- Map the flow of ARV medicines through the supply system including the processes of procurement, quantification, distribution, and dispensing.
- Understand the roles and responsibilities of staff at each level in managing medicines for the ART Program.
- Identify forms, tools, and procedures used for procuring ARV medicines, managing inventories, recording medicine transfers, dispensing, and reporting data.
- Solicit feedback on which procedures and tools currently being used are effective in managing ARV medicines and which may need to be strengthened to support program scale up.

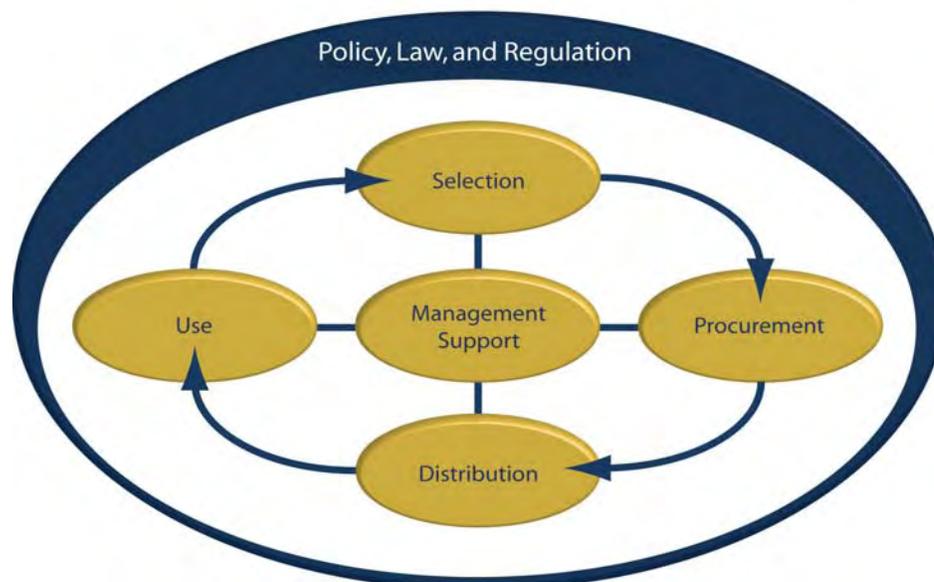
Methodology

The SPS/WHO team conducted semi-structured interviews with key informants, observed operations, and reviewed some records to prepare this report. In addition, information was drawn from reports given by the CDC and ART site staff at most of the sites visited. The reports typically summarized the status of the ART program and outlined the key challenges related to pharmaceutical management encountered at their sites and suggestions to address these constraints. The documents reviewed included national and provincial-level standard treatment guidelines including the *National Free ARV Treatment Manual, Second Edition (January 2008)*, the *Guangxi ARV Drug Management Protocol (2007)*, and assessment reports including the *Draft Report of the Joint Assessment of Procurement and Supply Management System Guangxi Autonomous Region: Family Care Project* conducted by NCAIDS, WHO, and the Clinton Foundation in 2006. A list of the persons interviewed is included in Annex 1.

The schedule for the SPS/WHO team visits follows.

Site	Date of Visit
Heng County CDC	December 3, 2008
Heng County People's Hospital	December 3, 2008
Liuzhou City CDC	December 4, 2008
Liuzhou City CDC ART Treatment Center	December 4, 2008
Guangxi Zhuang Autonomous Region Longtan Hospital	December 4, 2008
Luzai County CDC	December 5, 2008
Luzai County People's Hospital	December 5, 2008
Guilin City CDC	December 6, 2008
Guilin The Third People's Hospital	December 6, 2008
Guangxi Provincial CDC ART Treatment Center, Nanning	December 7, 2008
Guangxi Provincial CDC ARV Store	December 7, 2008
Nanning The Fourth People's Hospital	December 7, 2008

The framework used to organize the data collection and report on findings and recommendations is the pharmaceutical management cycle (figure 1). Managing pharmaceuticals—including ARVs—in any setting (public or private sector) and at any level (local, provincial, or national) follows a well-recognized cycle of selection, procurement, distribution, and use. The functions of management support—including the pharmaceutical management information system, and monitoring, and evaluation—hold the cycle together. The cycle is supported by policies, laws, and regulations



Source: Management Sciences for Health

Figure 1. Pharmaceutical Management Cycle

Accordingly, the key considerations reported on in this report include—

- Policies and guidelines: the availability of SOPs and standardized forms
- Selection: ARV products and regimens used
- Procurement: procedures for forecasting needs and procuring ARVs from the central level and from other partners, including the Clinton Foundation and GlaxoSmithKline
- Distribution: procedures for quantifying needs and requisitioning at the local level, and receiving, storing, and issuing ARVs including record keeping and inventory control methods
- Use: dispensing, counseling, and rational use
- Pharmaceutical management information system
- Program management: monitoring and supervision, and human resources

The key findings and recommendations from the visits to ART treatment and distribution sites are presented in the main body of the report. The summaries of site-specific findings are set out in a separate report.²

Caveats and Limitations

The information on which this report is based very often came from one source. Due to the limited time available for the visit and for interviews, SPS staff did not have the opportunity to cross-check information. Guangxi is a large province and there may be some variation in the methods used to manage ARVs especially in the more remote areas. The purpose of the SPS/WHO team visits was to understand and not assess the existing forms and systems although the team did solicit input from staff on problems and issues that need to be addressed. As a result, the team observed and inventoried processes used and records kept, but did not assess the quality of operations and record-keeping.

Introduction to the ART Program in Guangxi Province

Located in the south-east of China, Guangxi Zhuang Autonomous Region borders Vietnam and the Chinese provinces of Yunnan, Guizhou, Hunan, and Guangdong. The province with its population of 48.9 million³ (2004) was estimated to have between 60,000-80,000 people living

² Walkowiak, H., S. Hollist, C. Osborne and L. Zhang. 2009. *Pharmaceutical Management of Antiretroviral Medicines in Guangxi Province, China: Site-Specific Reports of SPS/WHO Visits to Treatment and Distribution Sites, December 1-10, 2008*. Submitted to the U.S. Agency for International Development by the Strengthening Pharmaceutical Systems (SPS) Program. Arlington, VA: Management Sciences for Health.

³ China Statistical Yearbook 2005

with HIV in 2007.⁴ Key informants report that injecting drug use is a significant mode of HIV transmission in Guangxi and nationally, the Ministry of Health (MoH) estimates that of the 700,000 people living with HIV in 2007, 38.1 percent were infected through injecting drug use.⁵ As a consequence, co-infection with hepatitis B and C is not uncommon in patients presenting for treatment.



Figure 2. Map of Guangxi Province

The public sector in Guangxi Province began providing ART in 2003 and Guangxi CDC reports that at the end of September 2008, approximately 5,217 persons including 144 children were receiving ART. At the time of the visit, 37 ART treatment centers—2 located at provincial-level, 14 at prefecture/city level, and 21 at county-level facilities—were providing ART. Three treatment centers were located within closed settings, that is, in prisons and rehabilitation centers. Pediatric ARV products have been available since 2005 through a donation from the Clinton Foundation and children are treated at three treatment centers in the province—Guangxi CDC ART Treatment Center in Nanning, the First People's Hospital in Hezhou, and Guangxi Zhuang Autonomous Region Longtan Hospital in Liuzhou. Women and Children Hospitals are among the sites that provide ARVs to prevent mother-to-child-transmission (PMTCT) of HIV. The status of the ART program in the province as a whole and in the ART treatment centers visited is summarized in table 1.

⁴ UNGASS Country Progress Report: P.R. China. Reporting period: January 2006 to December 2007. Available at http://data.unaids.org/pub/Report/2008/china_2008_country_progress_report_en.pdf [Accessed December 24, 2008]

⁵ Ibid

The program is growing rapidly as can be seen from Table 1. By the end of 2008, the number of people on ART in the province is expected to have doubled in just one year from approximately 3,500 to 7,500. Moreover, Guangxi CDC projects that by the end of 2009, the number of patients on ART will double again to 15,000. This expansion represents more than a three-fold increase in the volume of ARV medicines that will need to be ordered, stored, and distributed in just two years. Guangxi CDC reports that while 8 to 10 new treatment centers may be established in 2009, the majority of these new patients are expected to be absorbed by existing sites. For six of the seven treatment centers visited, the increase in patients between 2007 and 2008 ranged between 21 percent and 229 percent with an average increase of approximately 118 percent. Clearly, this level of scale-up will have a significant impact on pharmaceutical management operations both at treatment centers and also at the CDC distribution sites that supplies are drawn from.

Organization of the ARV Supply System in Guangxi Province

The ARV supply system in Guangxi province (figure 3) is based on information gathered during the visits. ARV medicines are managed as a vertical program by Guangxi CDC along with one Chinese traditional medicine, Tangcao Pian; HIV diagnostic, CD4, and viral load reagents, and infant milk substitutes. Medicines to prevent and treat opportunistic infections (OIs) and other ART-related medicines and laboratory reagents are managed as part of the essential medicines program by the BOH.

ARVs are procured primarily by the Government of China with additional donations from the Clinton Foundation and GlaxoSmithKline. At the national level, the Department of Health (DoH) and the Department of Finance (DoF) select suppliers through an annual bidding process and Guangxi CDC orders medicines quarterly from these suppliers. ARVs are stored and distributed at three levels of the health care system, at the Provincial CDC ARV Store and at city and county-level CDC stores. At each level, CDC staff requisition ARVs from the level above usually quarterly, using a pull system. More recently, several stores and treatment centers have been ordering monthly due to shortages of ARVs at the Provincial Store. ART treatment centers

Table 1. Status of the ART Program in Guangxi Province and in the ART Treatment Centers Visited

Location	Health system level and facility type	Program Status	Number of patients receiving ART (2007)	Number of patients receiving ART (2008) ⁶	Percentage increase in patients from 2007 to 2008
Guangxi Zhuang Autonomous Region	Province <ul style="list-style-type: none"> ▪ 37 treatment sites ▪ 3 sites serving children 	ART program started <ul style="list-style-type: none"> ▪ 2003 (adults) ▪ 2005 (children) 	3,500 (approx.)	Total: 5,217 (end of Sept. 2008) <ul style="list-style-type: none"> ▪ 5,073 adults ▪ 144 children ▪ 25 on second-line ART (supplied by CDC) Projected total at end of 2008: 7,000	100% (projected end of 2008)
Guangxi CDC ART Treatment Center, Nanning	Provincial-level outpatient clinic located at and managed by CDC	ART program started July 2003	400 (approx.)	Total: 500 (approx.) <ul style="list-style-type: none"> ▪ 429 adults ▪ 71 children ▪ 30 on second-line ART (supplied by MSF-France) 	25% (approx.)
Guangxi Zhuang Autonomous Region Longtan Hospital, Liuzhou	Provincial-level Infectious Diseases Hospital	ART program started July 2005	973	Total: 1,464 (Nov 1, 2008) <ul style="list-style-type: none"> ▪ ? adults (information not collected) ▪ ? children (not collected) ▪ 5 on second-line ART 	51% by Nov. 1, 2008
Liuzhou City CDC ART Treatment Center	City-level outpatient clinic located at and managed by CDC	ART program started Dec .2005	70 (approx.)	Total: 138 (Dec 4, 2008) <ul style="list-style-type: none"> ▪ 138 adults ▪ 0 children ▪ 0 on second-line ART (1 patient waiting for approval to start) 	97% (approx.) by Dec. 4, 2008
Nanning The Fourth People's Hospital,	City-level infectious diseases hospital	ART program started Feb. 2005	350	Total: 422 (Dec. 7, 2008) <ul style="list-style-type: none"> ▪ 422 adults ▪ 0 children ▪ 3 on second-line ART (8 patients waiting for results) 	21% by Dec. 7, 2008
Guilin, The Third People's Hospital,	City-level infectious diseases hospital	ART program started Sept. 2006	110 (approx.)	Total: 300 (approx.) <ul style="list-style-type: none"> ▪ 300 adults ▪ 0 children ▪ 0 on second-line ART 	173% (approx.)
Heng County People's Hospital	County-level hospital	ART program started Sept. 2005	40-50 (approx.)	Total: 147 (Dec. 3, 2008) <ul style="list-style-type: none"> ▪ 147 adults ▪ 0 children ▪ 0 on second-line ART (3-5 patients waiting to start) 	227% (approx.) by Dec 3, 2008
Luzai County People's Hospital	County-level hospital	ART program started May 2006	79	Total: 260 (Dec. 5, 2008) <ul style="list-style-type: none"> ▪ 260 adults ▪ 0 children ▪ 0 on second-line ART 	229% by Dec. 5, 2008

⁶ Number of patients on second-line ART part of the total number of adults and children.

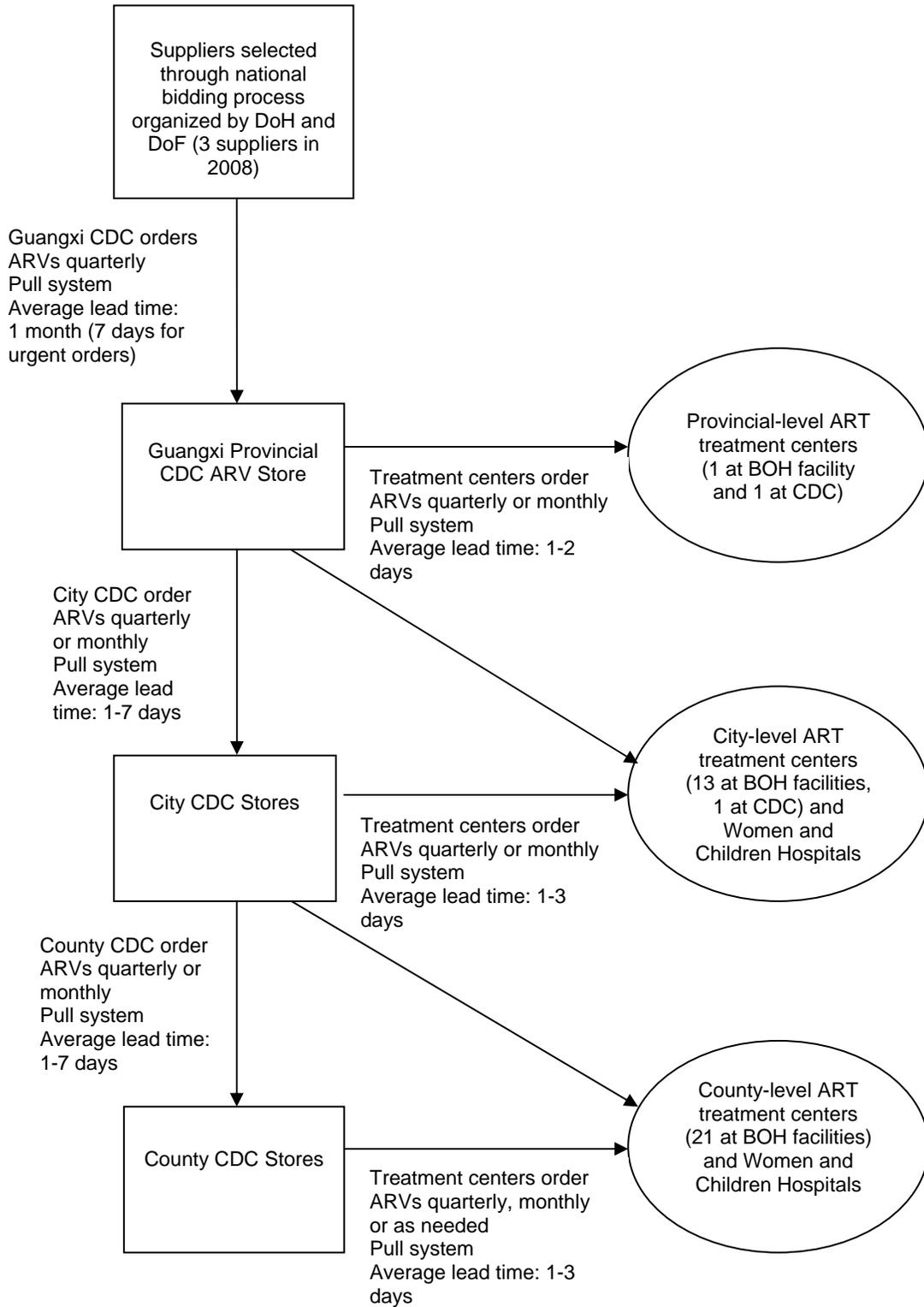


Figure 3. ARV Supply System in Guangxi Province

and PMTCT sites, such as Women and Children Hospitals, then requisition ARVs from the local CDC quarterly or monthly or, in some cases, as needed using a pull system. Patients receive ARVs at 37 ART treatment centers located at provincial, city, and county-level facilities. Two of the treatment centers are managed by CDC, while the others are located at BOH facilities. Médecins Sans Frontières (MSF) France provides support, including second-line ARVs to one ART treatment site in Nanning.

The pharmaceutical supply system with three different operating levels requires efficient inventory and storekeeping practices and an effective information tracking system to avoid overstocking and shortages of ARV medicines.

During the 5-day visit, the SPS/WHO team visited distribution and treatment sites at each level to gather information on ARV pharmaceutical management operations, including two of the three centers in the province that provide ART services to children. Major observations and key findings are reported in the main body of the report. The summaries of site-specific findings are set out in a separate report referenced earlier.

Distribution and ART treatment centers visited by the SPS/WHO team—

- Provincial-level distribution site
 - Guangxi Provincial CDC ARV Store, Nanning
- Provincial-level ART treatment centers
 - Guangxi Provincial CDC ART Treatment Center, Nanning (pediatric treatment site)
 - Guangxi Zhuang Autonomous Region Longtan Hospital (pediatric treatment site)
- City-level distribution sites
 - Guilin City CDC (No storage area; supplies are distributed immediately on receipt)
 - Liuzhou City CDC
- City-level ART treatment centers
 - Guilin The Third People's Hospital
 - Liuzhou City CDC ART Treatment Center
 - Nanning The Fourth People's Hospital
- County-level distribution sites
 - Heng County CDC (No storage area; supplies are distributed immediately on receipt)

- Luzai County CDC
- County-level ART treatment centers
 - Heng County People's Hospital
 - Luzai County People's Hospital

Policies and Guidelines

Policies

The Guangxi Provincial ART Program is implemented in accordance with the national standard treatment guidelines set out in the *ARV Treatment Manual Second Edition* and the national PMTCT guidelines issued in 2006. When the ART program first started in 2003, patients were required to pay for ARVs until 2004 when the policy changed. Currently in Guangxi province, ARV medicines, HIV diagnostic, CD4, and viral load testing are provided free of charge as per the national “Four Frees, One Care” policy. User fees are charged for OI medicines and other laboratory tests although exemptions are reportedly available for the very poor.

Residents of Guangxi province can obtain ARVs through the public health system. Migrant workers that have a resident or transfer form from their physician and plan to work in Guangxi province for three months or longer can obtain ARVs at an ART treatment center closest to their place of work. Guangxi residents working in other provinces can make similar arrangements, although ART services may not always be easily accessible.

SOPs

No written national or provincial SOPs for ARV pharmaceutical management were reported to be available at the time of the visit. However SPS understands that national regulations on HIV pharmaceutical management have been drafted and national guidance related to HIV pharmaceutical management is under preparation. Guangxi CDC has prepared a set of standard pharmaceutical management forms to be used by ART distribution sites, ART treatment centers and PMTCT sites for ordering and receiving ARVs and reporting on forecasted need and monthly usage. These forms are contained in the *Guangxi ARV Drug Management Protocol* issued by Guangxi BOH in 2007 along with forms used for managing HIV diagnostic, CD4, and viral load reagents, and infant milk substitutes. Feedback on the usefulness of the forms and suggestions for improvements from key informants is reported in the Pharmaceutical Management Information System section.

Written SOPs were identified as a key intervention to standardize and improve the efficiency of pharmaceutical management operations by staff at several of the ART treatment centers and at the Guangxi CDC debriefing. Many of the staff managing ARVs at the ART treatment sites are part-time and have other responsibilities so facility managers want standardized procedures and simple tools to streamline activities to facilitate the efficient use of their staff.

Selection

Prescribers and key informants at all sites visited reported that ARV products and regimens are selected on the basis of recommendations set out in the *ARV Treatment Manual Second Edition*. The regimens recommended in this manual are broadly in line with current WHO recommendations.^{7,8} However, prescribers reported that adherence to recommendations for second-line treatment is constrained by the limited availability of second-line ARV products. Facilities providing ARVs for PMTCT follow the recommendations set out in the 2006 national guidelines.

The Provincial CDC ARV Store stores and distributes 19 ARV products (table 2).

- The six products used primarily in first-line regimens were reported to be available at all of the seven treatment centers visited.
- Selected ARV products used primarily in alternative first-line or second-line regimens or for post-exposure prophylaxis (PEP) of HIV were reported to be stocked at three of the seven ART treatment centers visited (both provincial centers and one city-level center).
- The eight ARV products supplied by the Clinton Foundation for children were available only at the centers designated to treat children—Guangxi CDC ART Treatment Center in Nanning and Guangxi Zhuang Autonomous Region Longtan Hospital in Liuzhou.

No fixed-dose combination products are available through the national ART program and ARVs are reportedly not available in the private sector in Guangxi province.

Table 2. ARV Products Procured and Distributed by Guangxi Provincial CDC ARV Store

	Generic name	Product
Products used in first-line regimens	Efavirenz (EFV)	600 mg tablet
	Lamivudine (3TC)	300 mg tablet
	Nevirapine (NVP)	200 mg tablet
	Stavudine (d4T)	15 mg capsule
		20 mg capsule
	Zidovudine (AZT)	300 mg tablet
Products used in alternative first-line, PEP, or second-line regimens	Didanosine (ddl)	25 mg tablet
		100 mg tablet
	Indinavir (IDV)	200 mg capsule
	Lopinavir/ritonavir (LPV/r)	200/50 mg tablet
Tenofovir (TDF)	300 mg tablet	

⁷ WHO. 2006. *Antiretroviral Therapy for HIV Infection in Adults and Adolescent: Recommendations for a Public Health Approach. 2006 Revision*. Geneva: WHO

⁸ WHO. 2006. *Antiretroviral Therapy of HIV Infection in Infants and Children: Towards Universal Access. Recommendations for a Public Health Approach*. Geneva: WHO

	Generic name	Product
Products stocked for children (supplied by Clinton Foundation)	Efavirenz (EFV)	50 mg capsule
		200 mg capsule
	Lamivudine (3TC)	10 mg/ml liquid
		150 mg tablet
	Nevirapine (NVP)	10 mg/ml liquid
	Stavudine (d4T)	1 mg/ml liquid
	Zidovudine (AZT)	10 mg/ml liquid
		100 mg capsule

At present, availability of second-line ARV products through the public sector in Guangxi province is very limited. Initiation of second-line treatment must be approved by Guangxi CDC and criteria for initiation are set out in a formal checklist. Two of the sites visited had patients waiting to receive approval to start second-line ART and, at one site, 30 patients receive second-line ARVs with support from MSF-France. Guangxi CDC staff members report that several sites have patients waiting for viral load and genotype testing results so requirements for second-line products could be significant once they become available from the national level which we understand to be 2009. Making second-line ARVs available for patients who need them is of paramount importance. Once second-line products are widely available, forecasting needs is likely to be more complex and staff tasked with ordering supplies will need guidance on developing assumptions and tools to estimate needs.

The *National Free ARV Treatment Manual* was updated in January 2008 (*Second Edition*) and prescribers are reported to have implemented the new prescribing recommendations in the second edition relatively quickly at treatment centers visited. As forecasting and procurement for 2008 was based on recommendations in the first edition, shortages of some ARV products and overstocks of others have occurred as a result. New recommendations include initiating treatment at a CD4 count of 350 instead of 200 and key informants suggest that this change may be partly responsible for the doubling of patients on treatment in 2008. Other changes in prescribing trends in 2008 reported during the visits include—

- Switching patients who started ART in 2003 when lamivudine (3TC) was unavailable from regimens containing combinations of didanosine (ddI) and stavudine (d4T) to regimens containing zidovudine (AZT)/3TC or d4T/3TC.
- Increased use of AZT/3TC-based first-line regimens in preference to d4T/3TC because of concerns about long-term toxicity of d4T.
- Increased use of EFV in preference to NVP because of increases in the number of patients presenting with tuberculosis and hepatitis B and C co-infections.

Staff responsible for ordering supplies report that these prescribing changes have made it difficult to develop assumptions about future use to quantify needs. Producing the annual forecast of needs is reported to be especially problematic as guidelines changes continue to be implemented.

Procurement

Tendering and Procurement

ARVs are procured primarily by the Government of China with additional donations from the Clinton Foundation and GlaxoSmithKline.

- Of the 11 ARV products used to treat adults (table 2), 7 are procured from 3 domestic suppliers.
- Two of the three imported products—lopinavir/ritonavir (LPV/r) 200/50 mg tablets and tenofovir (TDF) 300 mg tablets—are procured primarily at the national level with additional procurements by the provincial CDC as needed. Efavirenz (EFV) 600 mg is currently procured mainly at the provincial level. Central level funds are allocated for the procurement of these products and funding is transferred to the provincial BOH by the MoH for this purpose.
- One product—3TC 300 mg tablet—is donated by GlaxoSmithKline.
- All eight products used to treat children are donated by the Clinton Foundation.

Responsibility for managing the ARV tender was transferred from the provincial to the national level in 2007 primarily to speed up the tendering process and improve pricing. Under the current system, the DoH and DoF are responsible for selecting suppliers through an annual bidding process at the national level, and Guangxi CDC then orders medicines quarterly from these suppliers. Suppliers cover the transport costs and some deliver supplies in monthly shipments. The lead time is generally four weeks but can be as little as one week for urgent orders. There is no formal system for monitoring and reporting on the performance of supplier at the central or provincial level and samples are not routinely drawn from shipments or facilities in the province for quality control testing. Donated ARV products are also ordered quarterly through the central level with the exception of 3TC 300 mg tablets which are distributed monthly. The lead time for these products is one-two weeks on average.

However, at the time of the SPS/WHO team visit, no ARV products had been purchased by Guangxi province under the national bidding process for 11 months of 2008. It is understood that this is a result of delays in completing the tender but because of the limited time available for this survey, it was not possible for the SPS/WHO team to collect more information at the national level. To fill the gap, Guangxi CDC has processed two emergency tenders in 2008 following the procurement regulations set out at the national level. But the process can be lengthy, taking between three to six months to complete, and some ARVs have been in short supply at the Provincial Store for extended periods of the year. Securing approval for these ad hoc purchases further delays the process. Furthermore, central funding for EFV is based on 20 percent of new patients requiring EFV but co-infection rates with tuberculosis and hepatitis B and C and consequently, prescribing rates of EFV are reportedly much higher in Guangxi province. Persistent shortages of donated 3TC 300 mg tablets at the national level, apparently due to hold ups at customs and higher than projected usage, have further complicated supply management.

No treatment interruptions are reported to have occurred for patients but CDC staff members at the Provincial Store have been rationing supplies and are on constant alert to manage shortages. Orders from lower levels often cannot be filled in full—increasing order frequency, staff time, and transport costs at all levels. To avoid stock outs, treatment centers are issuing smaller quantities to patients who must return more frequently to collect refills increasing their transportation and, in some cases, accommodation costs. For staff at the Provincial Store and CDC and BOH staff at almost every distribution and treatment site visited, improving the supply of ARVs at the Provincial Store was a major priority. Senior managers at Guangxi BOH and CDC report that continuing uncertainty in the ARV supply chain is progressively becoming a major bottleneck to scaling up ART as prescribers are increasingly reluctant to start new patients if an uninterrupted supply of ARVs cannot be assured.

Forecasting Annual Needs and Procurement Quantities at the Provincial Level

Guangxi CDC submits an annual forecast or plan of products needed to treat adult patients to the national level as a memorandum, usually in February of each year. This forecast is used to calculate the total quantity of each medicine to be included in the tender documents at the national level. A bottom-up approach is used to prepare these annual forecasts. At each level, CDC staff consolidate forecasts submitted by ART treatment centers, PMTCT sites, and lower-level CDCs using *Adults HIV Antiretroviral Therapy Medicine Use Plan* and *Children/PMTCT Free HIV Antiviral Therapy Medicine Use Plan* (annexes 5 and 6 in *Guangxi ARV Drug Management Protocol*) and submit forecasts using the same forms to the level above.

The provincial level receives 14 reports from lower levels usually in October of each year. An annual forecast is not required for ARVs donated by the Clinton Foundation. The annual estimates are cross-checked with data submitted in the latest monthly report (annexes 10 and 11 in the *Guangxi ARV Drug Management Protocol*) for each site, then consolidated and three months' supply is added as a buffer stock. The stock on hand in the Provincial Store is not deducted from needs and provides an additional buffer. The pharmacist tasked with forecasting needs for the province cross-checks assumptions on projected scale-up with demographic data and historical data on regimen changes due to side effects and treatment failure. She also solicits comments on future prescribing trends and potential guideline changes from senior managers and selected prescribers.

To calculate quarterly procurement quantities, the pharmacist uses the monthly reports submitted by treatment centers to generate estimates on the number of patients on each adult product and regimen and the projected number of new patients expected in the next quarter. The estimates are consolidated, cross-checked as described above for the annual estimates, stock on hand in the provincial store is deducted, and one month of buffer stock added. Quarterly estimates for children are generated by the Guangxi CDC pediatric specialist for the three pediatric ART treatment sites. Quantities needed for each child are calculated individually, adjusted for projected growth and changes from liquid to solid or adult formulations, and consolidated. Estimated needs are cross-checked with consumption data and adjusted for stock on hand.

Both staff members use “homemade” Excel spreadsheets to calculate annual needs and procurement quantities. The Clinton Foundation has developed an Access-based tool for

forecasting annual needs and procurement quantities and it is currently being tested at a number of sites in the province. The tool is yet to be translated into Chinese and the initial feedback is that the tool is somewhat complicated to use.

The main challenges reported to estimating annual requirements and quarterly procurement quantities at the provincial level include—

- Lack of simple, preferably Excel-based tools and standardized procedures for analyzing data and quantifying needs
- Developing assumptions about future use and rate of scale-up is reported to be especially problematic, particularly for annual forecasts as guideline changes are implemented. Errors in forecasting are magnified as estimates are consolidated and mostly manifest as substantial underestimates of need at the provincial level. The estimated increase in new patients for the next year or quarter is very often omitted in reports submitted by lower levels and some centers submit reports late. Adjusting ARV product needs for children for growth and formulation changes is especially complex.
- Consumption data is not used to cross-check projections for adult products as few ART treatment centers report this data on a monthly basis to the provincial level. Staff at treatment centers reportedly find it difficult and time-consuming to extract consumption data from existing data collection tools.
- In 2008, Guangxi CDC was requested to submit its annual estimates of products needed to treat adult patients to the national level in November 2008, four months early, and before forecasts generated using the bottom-up approach were available at the provincial level.

Distribution

As noted earlier, ARV medicines move through three operational levels of the supply system (provincial, city and county) and ARVs are issued to patients at provincial, city and county-level ART treatment sites. ARVs for PMTCT are issued at Women and Children Hospitals among others. The SPS/WHO team visited distribution points at all levels to observe operations and solicit feedback. Major observations and findings are summarized in this section. The summaries of site-specific findings are set out in a separate report referenced earlier.

Guangxi Provincial CDC ARV Store in Nanning

Storekeeping

Guangxi CDC has recently relocated some departments to a new building and ARV medicines are stored in two rooms in the “old” provincial CDC building close to Guangxi Provincial CDC ART Treatment Center. Only one of the storage areas was visited during the trip as the key was not available to the other room but both are reported to be of a similar size and to be air-conditioned. The temperature of the storage areas is reportedly monitored daily and an updated

temperature chart was seen on the storeroom wall. The storage room was observed to be secure and tidy but very full, and more storage space will likely be needed as the program is projected to double in size in 2009. Some shelving and pallets are available but more are needed as some boxes were seen to be stored on the floor. Refrigerated space is no longer a concern as the Kaletra[®] brand of LPV/r has been replaced by Aluvia[®] tablets which do not need to be refrigerated. Products are stored according to expiry date and staff report that ARVs are issued on a first expiry, first out (FEFO) basis.

Inventory Management

The procedures employed for receiving and managing inventories are outlined below.

- **Record keeping.** The Provincial Store uses a combination of manual and Excel-based tools to maintain records of receipts, issues, stock on hand, information on batch numbers, and expiry dates. An electronic stock card is used to record inventory transactions and is reportedly updated daily. No inventory management software or tools to facilitate tracking supplies in the system to avoid overstocking and shortages of ARV medicines were seen to be available.
- **Receiving.** Items received are cross-checked with the supplier delivery note and the endorsed note is faxed back to the supplier along with any information on damages and discrepancies. In general, a minimum expiry date of 18 months is required but the stores staff report that it is not rigidly enforced and they will accept shorter dated stock if they can use it up before it expires. Receipts are recorded in the electronic stock card and a *Medicine Warehouse Entry List* (annex 8 in the *Guangxi ARV Drug Management Protocol*) is produced each time a delivery is received.
- **Inventory control.** As reported earlier, stocks of some ARV medicines are low in the Provincial Store due to procurement delays at the central level and staff report difficulties in maintaining usual buffer stocks of one month supply. Although some short-term stock-outs, e.g., 3TC 300 mg tablets, have occurred at the Provincial Store, no treatment interruptions have been reported to date. Although inventory control methods that use reorder or minimum order levels to trigger re-supply are not used, the store's staff members monitor stocks carefully and are on constant alert to redistribute or ration supplies to prevent stock-outs at the patient level. Physical stock takes are done monthly and reported quarterly using *Medicine Inventory List* (annex 12 in the *Guangxi ARV Drug Management Protocol*).
- **Monitoring expiry dates.** A system is in place for monitoring short-dated stock and a list of products and quantities due to expire in the next six months was seen on the storeroom wall. Staff report that lower levels can return short-dated stock to the Provincial Store for re-issue to a high volume site. Similarly, the Provincial Store can request approval from the national level to release stock that cannot be used before it expires to another province. Reportedly, stock rarely expires. However, the store's staff members report that a substantial quantity of d4T capsules is likely to expire before it can be used because of changes in prescribing trends, and they plan to request national-level approval to redistribute this stock.

Distributing ARVs

City-level CDC stores and the two provincial ART treatment sites requisition ARVs directly from the Provincial Store, usually quarterly, using a pull system. More recently, several stores and treatment centers have been ordering monthly instead of quarterly due to supply shortages at the Provincial Store. The Provincial Store also distributes ARVs to some local lower-level stores and treatment centers. Interim emergency orders can also be placed as needed. ARVs are requisitioned using *Adults HIV Antiretroviral Therapy Medicine Use Plan* and *Children/PMTCT Free HIV Antiviral Therapy Medicine Use Plan* (annexes 3 and 4 in *Guangxi ARV Drug Management Protocol*). The closest site is Guangxi CDC ART Treatment Center (next door) and the furthest store is more than 500 km away from Nanning. The lead time is between 1 to 7 days.

Orders are reviewed by Guangxi CDC staff who cross-check quantification calculations with the latest monthly reports and make adjustments as needed. Moreover, quantities are further adjusted based on the stock available in the Provincial Store. As mentioned earlier, orders from lower levels often cannot be filled in full increasing order frequency, staff time, and transport costs. The ARVs are issued along with *Medicine Warehouse Delivery List* form (annex 9 in *Guangxi ARV Drug Management Protocol*). ARVs are collected and transportation costs are covered by the treatment center or lower-level CDC and are reported to be substantial. To contain transportation costs, stores and centers far from the Provincial Store can elect to have ARVs sent by the postal service. It is not known what procedures are used to maintain the quality of medicines if this option is selected.

City-level CDC ARV Stores

City-level CDC stores visited in Guilin and Liuzhou. Information on the number of facilities served by each CDC store is given in table 3.

Table 3. Number of Facilities Served by City-level CDC Stores Visited

City	Number of facilities served		
	County-level CDC	City-level ART Treatment Center	Mother and Children Hospital
Guilin	0	1	1
Liuzhou	3	1	0

Storekeeping

Guilin CDC does not have a storage area. ARVs are distributed to the two facilities served by Guilin CDC—Guilin The Third People’s Hospital, and Guilin Mother and Children Hospital—immediately on receipt.

In Liuzhou City, the ARVs are stored in a room along with anti-tuberculosis medicines in the city CDC building. The room is not air-conditioned but Liuzhou CDC hope to install air-conditioning in the next month. The temperature in the store is not monitored on a regular basis.

Supplies are protected from sunlight and the store was clean and tidy and appeared to be secure. The storage space is adequate and the ARVs are stored on pallets. Products are stored according to expiry date and staff report that ARVs are issued on a FEFO basis.

Forecasting Annual Needs and Order Quantities at the City Level

Both Guilin CDC and Liuzhou CDC work closely with treatment centers and lower level CDC staff to forecast annual needs and routine order quantities. Estimates are prepared using a morbidity-based method taking into account the number of patients on ART, the regimens used, and stock on hand, and added to the estimates for new patients. Consumption data is used by Liuzhou CDC to crosscheck estimates, but not by Guilin CDC. Guilin CDC adds a buffer of 10 percent for both the annual forecasts and order quantities while Liuzhou CDC incorporates a buffer (one month's supply) only into routine order quantities. As outlined earlier, annual estimates are submitted in October to the Provincial Store using the forms *Adults HIV Antiretroviral Therapy Medicine Use Plan* and *Children/PMTCT Free HIV Antiviral Therapy Medicine Use Plan* (annexes 5 and 6 in *Guangxi ARV Drug Management Protocol*). The procedure for requisitioning ARVs at the city-level is outlined below.

The challenges enumerated by staff to estimating annual requirements and routine order include—

- Some lower-level stores and ART treatment sites lack the capacity to estimate needs and Liuzhou CDC staff prepare estimates for them. Also staff at treatment centers typically have many other responsibilities and do not have the time to extract data from routine encounter forms, and to then analyze it and calculate needs.
- Staff tasked with forecasting needs lack training, simple tools (both computerized and manual), and standardized procedures for analyzing data and quantifying needs.
- Developing assumptions about new patients and their regimens is especially problematic. Indeed, Liuzhou CDC has not yet submitted its annual forecasts because of difficulties in accurately estimating the rate of scale-up. Similarly, Guilin CDC is challenged in estimating how many of the HIV-positive clients who do not yet meet the criteria for ART and are routinely followed by the city will need to start in the next year.

Inventory Management

The procedures employed by Guilin CDC and Liuzhou CDC for requisitioning, receiving and managing inventories of ARVs are outlined below.

- **Record keeping.** No inventory records are kept by Guilin CDC as there is no storage area. Liuzhou CDC use a combination of manual and Excel-based tools to maintain records of receipts, issues, stock on hand and information of batch numbers and expiry dates. Receipts and issues are recorded in a homemade book at the time of the transaction and later entered into an Excel spreadsheet created by the staff member tasked with managing supplies. The spreadsheet is used to generate data on monthly consumption.

- **Requisitioning.** Both sites typically requisition ARVs quarterly using a pull system although Guilin CDC had to order monthly earlier in the year due to supply shortages at the Provincial Store. Both stores use *Adults HIV Antiretroviral Therapy Medicine Use Plan* and *Children/PMTCT Free HIV Antiviral Therapy Medicine Use Plan* (included as annexes 3 and 4 in *Guangxi ARV Drug Management Protocol*) to order ARVs. The lead time is usually 1-2 days and Guilin staff must usually stay overnight due to the distance from Nanning. Orders are often not filled in full and in the last quarter, Liuzhou CDC had to place three emergency orders. Both sites report that transport costs are significant and request that funding be allocated by the ART Program for this purpose.
- **Receiving.** At both sites, items received are crosschecked with *Medicine Warehouse Delivery List* form (included as annex 9 in *Guangxi ARV Drug Management Protocol*) included with the supplies. Guilin CDC open one or two boxes of each batch to inspect the contents while Liuzhou CDC only open boxes if they appear to be damaged. The delivery form is endorsed and faxed back to the Provincial Store along with any information on damages and discrepancies, although this is a rare occurrence. Both sites produce a *Medicine Warehouse Entry List* (annex 8 in the *Guangxi ARV Drug Management Protocol*) each time a delivery is received.
- **Inventory control.** No inventory is maintained by Guilin CDC. Liuzhou CDC maintains a buffer stock of one month for each product. Although inventory control methods that use reorder or minimum order levels to trigger re-supply are not used, CDC staff monitor stocks carefully and are on constant alert to redistribute or ration supplies to prevent stock outs at the patient level. The staff report that no stock-outs have occurred since the program started. Physical stock takes are done monthly and no discrepancies were reported in the last stock performed in November 2008.
- **Monitoring expiry dates.** Liuzhou CDC staff reportedly check expiry dates every 3 months and maintain a list of short-dated stock in the computer. Short-dated stock is exchanged for longer dated stock with Longtan Hospital or alternatively returned to the provincial store for exchange using *Medicine Withdraw Request Form* (annex 13 in the *Guangxi ARV Drug Management Protocol*). Guilin CDC also uses the same procedure to return stock to the Provincial Store for exchange.

Distributing ARVs

As Guilin CDC does not have a storage area, ARVs are distributed immediately on receipt. Both facilities served are in Guilin city and so transportation is not a significant cost. At Liuzhou, three county CDC stores requisition supplies monthly using a pull system and *Adults HIV Antiretroviral Therapy Medicine Use Plan* and *Children/PMTCT Free HIV Antiviral Therapy Medicine Use Plan* forms (annexes 3 and 4, *Guangxi ARV Drug Management Protocol*). Liuzhou City CDC ART Treatment Center orders as needed using the same forms. Orders are reviewed by Liuzhou CDC staff who contact the facility to check any unusually large orders. ARVs are issued with *Medicine Warehouse Delivery List* form (annex 9, *Guangxi ARV Drug Management Protocol*). ARVs are collected and transportation costs are covered by the treatment site or lower-level CDC.

County-level CDC ARV Stores

Heng County and Luzai County CDC Stores were visited on this trip. Information on the number of facilities served by each CDC store is given in table 4.

Table 4. Number of Facilities Served by County-level CDC Stores Visited

County	Number of facilities served	
	County-level ART Treatment Center	Mother and Children Hospital
Heng	1	0
Luzai	1	1

Storekeeping

Luzai CDC does not have a storage area, so when ARVs are received, they are distributed to the two facilities served by Luzai CDC—Luzai County People’s Hospital and Luzai Mother and Children Hospital. Stock is held in an office until it can be distributed.

In Heng County, the ARVs are stored in lockable cupboards in an air-conditioned room in the CDC building. Storage space is adequate and products are organized according to expiry date. Staff report that ARVs are issued on a FEFO basis.

Forecasting Annual Needs and Order Quantities at the City Level

Luzai County CDC uses the same methodology as the two city-level CDC stores described earlier adding a buffer of 10 percent for both the annual forecasts and order quantities. In contrast, Heng County CDC uses consumption calculation to calculate needs for existing patients and a morbidity-based calculation to estimate needs for new patients. For each product, the highest monthly consumption in the last 3 months recorded in the CDC store inventory records is multiplied by 12 to estimate needs for the annual forecast and by 3 to estimate quarterly procurement quantities. Estimated needs for new patients are added to the total. Stock on hand is not deducted and no additional buffer is added. The forecasts are submitted using the same forms used at the city level. The challenges reported by the county-level CDC staff are identical to the issues identified at the city level. The need for a tool was reiterated.

Inventory Management

The procedures employed by Heng County CDC and Luzai County CDC for requisitioning, receiving, and managing inventories of ARVs are outlined below.

- **Record keeping.** No inventory records are kept by Luzai County CDC as there is no storage area. Heng County CDC uses a combination of manual and Excel-based tools to maintain records of receipts, issues, and stock on hand. Receipts and issues are recorded in a “homemade” book at the time of the transaction and later entered into an Excel

spreadsheet created by the staff member tasked with managing supplies. The spreadsheet is used to generate data on monthly consumption for reporting and forecasting.

- **Requisitioning.** Both sites requisition ARVs quarterly using a pull system using the same forms used at the city-level. Heng County orders ARVs from Nanning City CDC and Luzai County from Liuzhou City CDC. The lead time is usually two to seven days, and the county CDC collects supplies, and covers transport costs. Orders are often not filled in full and as a result, Luzai County CDC placed six emergency orders and Heng County CDC one emergency order in the last year. Luzai County CDC report that transportation costs are significant and suggest that the province explore the option of contracting transportation out to a logistics agency.
- **Receiving.** The county-level stores follow the same procedures described previously for the city-level stores.
- **Inventory control.** No inventory is maintained by Luzai County CDC. Heng County CDC does not use reorder or minimum order levels to trigger re-supply; however, CDC staff monitor stocks carefully and are on constant alert to redistribute or ration supplies to prevent stock outs at the patient level. The staff report that no stock-outs have occurred since the program started. Physical stock takes are performed every two-three months and no discrepancies were reported in the last stock performed in November 2008.
- **Monitoring expiry dates.** Information was not collected because of lack of time.

Distributing ARVs

As Luzai County CDC does not have a storage area, ARVs are distributed immediately on receipt. Both facilities served are nearby and so transportation is not a significant cost. The nurse at the ART Clinic at Heng County People's Hospital orders supplies by telephone as needed and completes a *Medicine Warehouse Delivery List* form (annex 9, *Guangxi ARV Drug Management Protocol*) when she collects the ARVs from Heng County CDC.

Provincial, City, and County-level ART Treatment Centers

Seven ART treatment centers were visited during this trip. Information about the treatment centers including the location, facility type, and the number of patients on treatment is presented in table 1. Key observations on storekeeping practices and inventory management procedures are briefly outlined in this section. The summaries of site-specific findings are set out in a separate report referenced earlier. Due to time limitations, information was not collected on inventory management of ARVs at PMTCT sites.

Storekeeping

Of the seven treatment centers visited, three keep ARVs only at the dispensing point and four also hold stocks in the pharmacy store.

- Of the four storage sites visited, one—Longtan Hospital—did not have adequate storage space to store the ARVs. However, a new storeroom is reportedly under construction. All but one storage area—Luzai County People’s Hospital—was air-conditioned, and the temperature was not monitored and recorded in two of the four storage areas visited, Luzai County People’s Hospital and Guilin The Third People’s Hospital.
- Adequate storage space was available in the dispensing areas of all seven treatment centers visited. At Luzai County People’s Hospital, ARVs are stored in a locked cupboard in the ART clinic room and staff expressed concerns about the security of this arrangement. Five of the seven dispensing areas were air-conditioned. Only two centers were observed to routinely monitor and record the temperature at the dispensing point. Neither of the two treatment sites that do not have air-conditioned dispensing areas—Liuzhou City CDC ART Treatment Center and Nanning, The Fourth People’s Hospital—routinely monitor temperatures at the dispensing area.

Forecasting Annual Needs and Order Quantities at ART Treatment Centers

Six of the seven treatment centers use a morbidity-based methodology to prepare both the annual forecasts and order quantities. The exception is Heng County People’s Hospital which uses a combination of consumption and morbidity as described previously for Heng County CDC. The nurse at Guangxi Provincial CDC ART Treatment Center in Nanning uses a combination of morbidity and consumption-based calculations to estimate needs for routine ordering. The procedure for setting buffer stock is diverse; some sites add a percentage ranging from 10 to 30 percent, some add between one and three months’ supply, and one site adds sufficient quantities to treat five patients. In some cases, it is not clear how these buffer stocks are calculated given the absence of consumption data. The forecasts are submitted using the same forms used at the city and county-level CDCs.

The challenges listed under the forecasting section for the city-level CDC stores were reiterated by key informants from the treatment centers. In addition, ART treatment center staff highlighted the difficulties in extracting data from data collection tools used at the dispensing point and missing or inaccurate data was a problem reported by several centers. At one large center, Longtan Hospital, the staff responsible for ordering supplies do not always receive timely information on regimen changes at the clinic leading to inaccuracies in estimating needs.

Inventory Management

The procedures employed by the seven ART treatment centers visited for requisitioning, receiving, and managing inventories are outlined below.

- **Record keeping.** Of the four centers that keep ARVs in the pharmacy store, two stores do not keep any inventory records at the store, one uses a “homemade” stock card and

one uses the hospital inventory software to track issues and receipts of ARVs. Six of the seven treatment centers have developed manual tools such as tally sheets and stock cards to track issues to patients. However, the extent to which these “homemade” forms can easily generate data such as issues by product and the number of patients on each regimen for reporting and forecasting varies considerably.

- **Requisitioning.** Three of the seven treatment centers requisition ARVs quarterly, two monthly, and two as needed. All sites use a pull system using the same forms used by the city and county-level CDC stores. The lead time varies from 1 to 7 days and supplies are collected in all cases. Five out of the seven centers report that orders are often not filled in full necessitating interim emergency orders. One treatment center had placed six emergency orders in 2008 at the time of the visit.
- **Receiving.** In general, ART treatment centers follow the same procedures described previously for the city and county-level CDC stores. However, procedures for inspecting deliveries and reporting damages or discrepancies vary.
- **Inventory control.** None of the ART treatment centers use reorder or minimum order levels to trigger re-supply, however, staff monitor stocks carefully and are on constant alert to ration supplies to prevent stock outs at the patient level. The staff report that stock-outs are rare and that no treatment interruptions have occurred. Physical stock takes are reportedly performed regularly by the four centers that hold stock in the pharmacy store.
- **Monitoring expiry dates.** Four of the seven centers have procedures in place to monitor expiry dates. Short dated is returned to the local CDC store or exchanged with a nearly high volume center. Information was not collected at the three other centers due to lack of time.
- **Internal distribution.** Only one of the four sites that hold stocks of ARVs in a storage area has a system in place to track the movement of ARVs from the ARV storage area to the ARV dispensing area.

Use—Prescribing, Dispensing, and Counseling

In this section, some key features of the procedures used for prescribing and dispensing, including providing medication-related counseling at the seven ART treatment centers visited are outlined. The summaries of site-specific findings are set out in a separate report referenced earlier. Information about the treatment centers including the location, facility type, and the number of patients on treatment is presented in table 1. Information was not collected at PMTCT sites because of time constraints.

Prescribing

In four of the seven treatment centers, AZT/3TC/NVP is the most common first-line regimen used for adults; in two centers it is d4T/3TC/NVP. Most patients who were using a first-line

regimen containing ddI/d4T have now been switched to 3TC-containing regimens. The most common regimen used for children is also AZT/3TC/NVP. Three of the treatment centers have patients on second-line ART and the regimens in use are diverse possibly due to the limited availability of second-line ARVs.

As mentioned earlier, central funding for EFV is based on 20 percent of new patients requiring EFV but co-infection rates with tuberculosis and hepatitis B and C and, consequently, requirements for EFV are reportedly much higher in Guangxi province. Staff from several centers highlighted the need for more EFV and currently prescribers are asked to switch patients from EFV to NVP when they have completed treatment for tuberculosis, further complicating the forecasting process.

Official prescription forms are used at all treatment centers and for the first month, patients are prescribed two-week's worth of ARVs supplies at a time, then they receive monthly supplies thereafter. At some centers, patients whose adherence is deemed to be acceptable can collect their ARVs every two to three months. However, as discussed earlier, due to supply shortages some treatment centers have required patients to return monthly and sometimes every two weeks to collect refills increasing transportation and, in some cases, accommodation costs for the patient.

Dispensing

The procedures employed by the seven ART treatment centers visited for dispensing ARVs are outlined below.

- ARVs are dispensed at the ART clinic usually by a nurse and, in one case, a doctor, at five of the ART treatment centers visited. At two facilities, ARVs are dispensed at the hospital pharmacy.
- Tablet counters were not available at any dispensing point visited and staff use spoons and sometimes a plate, or at two centers, the cap of the bottle to count out medicines.
- Packing and labeling practices are diverse. Three centers dispense medicines in sealable plastic bags, and in one center, the bags are pre-printed with instructions. Waxed paper envelopes pre-printed with instructions are used at two centers and at one center the original container is dispensed and instructions are written on the bottle. Pill boxes were available at one center. Labels have been specifically printed for the ART program, however, due to a printing error the labels are used only at the one center that has received the re-printed and corrected labels. As a result, a variety of labels are in use and dispensed ARVs are reportedly labeled at all sites before issue.
- Record keeping practices also vary widely across sites and dispensers complete numerous forms—as many as five—for each encounter. All of the centers maintain a patient-centered longitudinal record for each patient and six of the seven centers have a “homemade” form (either a tally sheet or stock card) to collect data on issues. Data is collected manually at all centers although computers were reported to be available at all of the dispensing points visited.

Medication Counseling and Monitoring Adherence

Dispensers at all of the treatment centers indicated that they give some basic medication counseling to patients on taking medicines correctly. At three centers, more comprehensive medication counseling is provided by the dispenser including information on side effects while at three centers the patient is referred to other staff at the ART clinic for further counseling.

The dispenser plays some role in monitoring ART adherence at all sites; pill counts are performed and recorded at the dispensing point at four centers, and self-reports are collected at one. Standardizing methods and tools to monitor adherence and strengthening interventions to address inadequate adherence at the program level was identified as a priority by key informants at two of the treatment centers visited.

Pharmaceutical Management Information System

The following pharmaceutical management reports are produced on a regular basis.

- **Annual forecast or plan.** ART treatment sites forward an annual plan of their ARV product needs to the local CDC office, and CDC staff members at each level consolidate the reports and submit forecasts as described under the procurement section. Guangxi CDC then submits the annual forecast to the national level.
- **Medicine inventory report.** ART treatment sites submit an inventory report (receipts, issues, balance, and wastage) to the local CDC office every quarter using *Medicine Inventory List* (annex 12 in *Guangxi ARV Drug Management Protocol*). In addition to forwarding the report to the level above, the CDC office also submits a copy to the city or county BOH and the city or county AIDS office.
- **Monthly report.** *Adults ARV Monthly Report Form* and/or *Children ARV Monthly Report Form* (annexes 10 and 11 in *Guangxi ARV Drug Management Protocol*) are submitted monthly by centers to the local CDC office. The reports, which contain information on the number of patients on treatment, regimens used, and losses to follow up) are sent to the next level, above—the city or county BOH and the city or county AIDS office. Guangxi CDC submits a report to the provincial BOH.
- **Requisition report.** In addition to needs, when CDC stores and treatment centers order supplies quarterly or monthly from the level above, they are expected to submit information on the number of patients taking each product, current stock on hand, and the estimated number of patients expected to be on treatment in the next quarter.

Compliance with reporting requirements is uncertain as not all sites reported submitting all the reports listed above during the visits. Indicators that can be used to monitor availability and the performance of pharmaceutical management operations are not routinely calculated or tracked.

Feedback on data collection and reporting procedures is summarized below.

- There are too many forms and reports to complete. Some are reported to be duplicative, and tools need to be streamlined and consolidated where possible. Furthermore, it is difficult to extract data for operations and reporting from existing data collection forms. Staff managing ARVs have other responsibilities and improving the data collection tools was a priority for storekeepers, dispensers, and facility managers.
- Standardized and simple tools (both manual and electronic) are needed to record inventory transactions at all levels and to capture issues data at the dispensing point.
- A database that is linked to the patient information system and can generate data from dispensing encounters for reporting and for estimating forecasts and procurement quantities is needed as patient numbers increase.

Program Management

Monitoring and Supervision

Supervisory visits to ART treatment centers and stores are largely ad hoc and there is no formal procedure in place or supervision tool available for CDC monitoring and audit visits. As noted, indicators that can be used to monitor the performance of pharmaceutical management operations are not routinely calculated or tracked

Human Resources

The lack of funding to support ARV pharmaceutical management operations including data collection, forecasting needs, and reporting was mentioned as a constraint at all the sites visited. Staff members are currently managing ARVs on a part-time basis and standardized procedures and simple tools are needed to streamline activities to ensure efficient use of staff in the short term and funding is needed to support the program in the long term.

Training in pharmaceutical management was requested by several of the staff interviewed and is urgently needed at centers where trained staff have been transferred. Training in forecasting, including analyzing data, was identified as a specific priority. Guangxi CDC requested support from SPS in developing training materials and training staff.

Key WHO/SPS Visit Findings

The ART Program in Guangxi Province

- The ART program in Guangxi Province is growing rapidly. By the end of 2008, the number of people on ART is expected to have doubled in one year to 7,500 and by the end of 2009, the patient numbers are projected to double again to 15,000. For six of the seven treatment centers visited, the average increase in the last year is approximately 118 percent (range 21 percent to 229 percent).

- ARV medicines are managed as a vertical program by Guangxi CDC along with HIV diagnostic, CD4, and viral load reagents; and infant milk substitutes. OI and other ART-related medicines and laboratory reagents are managed as part of the essential medicines program by the BOH.
- ARVs are stored and distributed at three health care system levels—the Provincial Store, and at city and county-level CDC stores. With three different operating levels, the supply system requires efficient inventory and storekeeping practices, and an effective information tracking system to avoid overstocking and shortages of ARV medicines.
- Patients receive ARVs at 37 ART treatment centers located at provincial, city, and county-level facilities. Three of the centers provide services for children.

Policies

- ARV medicines and HIV diagnostic, CD4, and viral load testing are provided free of charge. User fees are charged for OI medicines and other laboratory tests with exemptions for the very poor.
- Standardized forms are provided for ordering and receiving ARVs and reporting on forecasted need and monthly usage.
- National regulations on HIV pharmaceutical management have been drafted and national guidance related to HIV pharmaceutical management is being prepared. Written standard operating procedures for managing ARVs and controlling inventories at each level are not available.

Selection

- ARV products and regimens are selected on the basis of recommendations set out in the *National Free ARV Treatment Manual* and the 2006 national guidelines for PMTCT. The ART regimens recommended in national ARV treatment manual are broadly in line with current WHO recommendations. Prescribers are reported to have implemented the new prescribing recommendations in the second edition relatively quickly at treatment centers visited. As forecasting and procurement for 2008 was based on recommendations in the first edition, shortages of some ARV products and overstocks of others have occurred.
- Availability of second-line ARV products is currently very limited and several sites have patients either waiting for medicines or results of viral load and genotype testing. Making second-line ARVs available for patients who need them is of paramount importance. Once second-line products are widely available, forecasting needs is likely to be more complex and staff tasked with ordering supplies will need guidance on developing assumptions and tools to estimate needs.

Procurement

- ARVs are procured primarily by the Government of China with additional donations from the Clinton Foundation and GlaxoSmithKline. Suppliers are selected at the national level through an annual bidding process and Guangxi CDC orders medicines quarterly from these suppliers. Two of the three imported products are procured primarily at the national level with additional procurements by the provincial CDC as needed; EFV 600 mg tablets are procured mainly at the provincial level.
- No ARVs have been purchased by Guangxi province under the national bidding process in 2008 and persistent shortages of donated 3TC 300 mg tablets have further complicated supply management. Guangxi CDC has processed two emergency tenders to fill the gap but some ARVs have been in short supply at the Provincial Store for extended periods during 2008.
- No treatment interruptions have occurred for patients but the provincial level staff are on constant alert to manage shortages. Orders from lower levels often cannot be filled in full increasing order frequency, staff time, and transport costs. To avoid stock-outs, sites issue smaller quantities to patients who must return more frequently to collect refills increasing their transportation and in some cases accommodation costs.
- There is no formal system for monitoring supplier performance at the central or provincial level, and samples are not routinely drawn from shipments or facilities in the province for quality control testing.
- A bottom-up approach is used to prepare annual forecasts of need and to determine procurement quantities. There are no formal procedures for estimating needs and the methods used by treatment centers and CDC stores, particularly for setting buffer stocks, are diverse. Simple tools to assist staff to analyze data and quantify needs are lacking.
- Developing assumptions about future use and rate of scale up is difficult particularly for annual forecasts as guideline changes are implemented. Data needed to develop assumptions is difficult to extract from existing data collection tools and often inaccurate or missing in reports from lower levels.

Distribution

- Storage space is generally adequate and well maintained, and pallets and shelving are available in most sites. Space is inadequate at Longtan Hospital but a new store is under construction. Furthermore, the Provincial Store will soon need more space and shelving as product volumes increase. At one site, staff expressed concerns about the security of ARVs held in an ART clinic room. One CDC store and one storage area and two dispensing areas at three of the treatment sites visited are not air-conditioned and temperatures are not routinely monitored at these areas. Store temperatures are monitored regularly and recorded at most CDC stores but at only two of the treatment centers visited.

- Communication and coordination between the CDC stores at all levels and treatment centers is generally good and centers can return short-dated stock for exchange. Most of the stores and some of the treatment centers had a procedure in place to monitor expiry dates.
- Forms to record inventory transactions—receipts, issues, running balance—are lacking at several sites. None of the stores or ART treatment centers use reorder or minimum order levels to trigger re-supply. However, staff monitor stocks carefully and are on constant alert to redistribute or ration supplies to prevent stock outs at the patient level and staff report that stock outs are rare and that no treatment interruptions have occurred so far. Methods for setting buffer stocks are diverse.
- Lead times are generally low, between 1 to 7 days. However, stores and treatment sites must collect deliveries from higher-level stores and transportation costs are reported to be significant.

Use—Prescribing, Dispensing, and Counseling

- Tablet counters are lacking and packing and labeling practices vary widely across treatment centers. Labels have been specifically printed for the ART program, however, due to a printing error, the labels are used only at the one center that has received the re-printed and corrected labels.
- Record keeping practices are also diverse and dispensers complete numerous forms—as many as five—for each encounter.
- Job aids or checklists to guide medication counseling are lacking. Procedures for monitoring adherence and addressing adherence problems vary from center to center.

Pharmaceutical Management Information System

- Staff members report that there are too many forms and reports to complete and find it difficult to extract data for operations and reporting from existing data collection forms. In many of the sites visited, staff have created their own tools to fill the gap. Tools need to be streamlined, consolidated, and improved.
- Standardized and simple tools (both manual and electronic) are needed immediately to record inventory transactions at all levels and to capture issues data at the dispensing point.
- At treatment sites with 200 or more patients, a database that can process data from dispensing encounters and accurately and quickly generate information for reporting and for estimating forecasts and procurement quantities is needed as a priority. Such a tool will be essential at other treatment centers as patient numbers increase.

Program Management

- Supervisory visits to ART treatment centers and stores are largely ad hoc and there is no formal procedure in place or supervision tool available for CDC monitoring and audit visits.

Indicators that can be used to monitor availability and the performance of pharmaceutical management operations are not routinely calculated or tracked.

- Funding to support ARV pharmaceutical management operations including data collection, forecasting needs, and reporting is lacking; staff are currently managing ARVs on a part-time basis.
- Training in pharmaceutical management and specifically in forecasting, including analyzing data is needed.

Recommendations

Policies

- Strengthen and standardize procedures for managing medicines and controlling inventories at each operating level. Ensure that procedures are consistent with good pharmaceutical management practices and national guidance. Develop and field-test written SOPs for key pharmacy operations including ordering, forecasting needs, inventory management, dispensing, information management, and reporting. Provide training to managers and staff and strengthen monitoring and supervision to reinforce implementation. Identify a few key indicators that can be used to monitor availability and the performance of pharmaceutical management operations and based on results adapt and roll out SOPs across the province.

Procurement

- Address the procurement delays at the national level as a priority and identify interim measures at the provincial level to resolve supply shortages. Establish a mechanism for communicating information on delays to the provinces early so that alternative procurement methods such as the provincial bidding process can be launched in good time. Improving and stabilizing the supply of ARVs is a major priority for managers at Guangxi BOH and CDC and staff working in stores and ART treatment sites at all levels.
- Establish a formal system for monitoring supplier performance.
- Improve forecasting at all operating levels by strengthening and standardizing methods for analyzing data, developing assumptions and estimating needs, and by providing tools appropriate to each level and for the number of patients served. Pilot the tools and procedures and support staff with on-the-job training.
- At the provincial level, establish a forecasting or planning working group to support the pharmacist tasked with preparing the annual forecasts. The role of this small group could include reviewing the quality of estimates and data submitted by lower levels; assisting in developing assumptions on future prescribing trends, guidelines changes, and scale up; developing justifications for increased budgets, e.g., for EFV for the national level; identifying barriers to forecasting, and providing recommendations.

Distribution

- Identify additional storage space and pallets or shelving at the Provincial Store. Introduce procedures and charts for monitoring temperatures and expiry dates in storage areas and dispensing points at all levels, especially at sites where ARVs are stored in areas that are not air-conditioned. Monitor temperatures at the hottest part of the day and if temperatures exceed the maximum recommended for ARV products, either improve the cooling system or relocate the ARVs to a storage area where temperatures meet acceptable standards.
- Introduce standardized tools for capturing transactions (receipts, issues, losses) and monitoring inventory.
- Develop a budget and identify funding to cover transportation costs.

Use—Prescribing, Dispensing, and Counseling

- Provide tablet counters and appropriate bags and supplies for labeling and packaging medicines.
- At the provincial level, strengthen and standardize medication counseling practices and procedures for monitoring adherence and addressing adherence problems. Provide training and a counseling checklist to enhance counseling practices.

Pharmaceutical Management Information System

- Streamline record keeping and reporting tools to facilitate data collection, analysis, and reporting, and improve information flow between each level.
- Institute steps to develop and implement a database that can process data from dispensing encounters and accurately and quickly generate information for reporting and for estimating forecasts and procurement quantities for high-volume treatment centers. Such a tool will be essential as patient numbers increase.

Program Management

- Develop a supervision tool and implement a regular schedule for CDC monitoring and audit visits. Establish systems for quarterly reporting and tracking of key indicators for ongoing monitoring of pharmaceutical management operations.
- Prepare a budget and identify funding to support ARV pharmaceutical management operations including data collection, forecasting needs, and reporting at all operational levels.
- Develop a standard minimum training package and ensure that all staff members responsible for managing and dispensing ARVs complete the training. Link training activities with the implementation of tools and SOPs.

ACTION PLAN FOR STRENGTHENING ARV PHARMACEUTICAL MANAGEMENT IN GUANGXI PROVINCE

Following the site visits, SPS met with stakeholders from Guangxi Province, NCAIDS, and WHO to present key findings and recommendations and to discuss activities that SPS could potentially support. Meetings were held with senior managers from Guangxi BOH and CDC in Nanning on December 9, 2008, and with NCAIDS managers in Beijing on December 10, 2008. Dr. Liu Shuaifeng, Guangxi CDC, and representatives from the Clinton Foundation joined the debriefing in Beijing.

Activities identified that SPS could potentially support include—

- Review of existing manual forms and tools to identify options to streamline, consolidate and fill gaps
- Development of SOPs including—
 - Drafting SOPs and related tools for review by stakeholders
 - Developing materials and delivering training on SOP implementation
 - Preparing procedures and a supervision tool for monitoring
 - Providing follow-up support
- Strengthening forecasting methods and developing tools to complement other partner efforts

SPS support is dependent on funding being available.

The activities were reviewed and agreed on in principle by stakeholders. The next steps as mapped out at the meetings follow—

- SPS will review the ARV pharmaceutical management forms and reports, and propose changes to refine and streamline the tools and fill gaps.
- SPS will develop a draft SOP manual for managing ARV medicines based on existing systems and revised formats and will include additional guidance on the following topics—
 - Basic principles of good pharmaceutical management practice
 - Procurement
 - Forecasting
 - Distribution flows of ARV medicines through the system
 - Inventory management practices
 - Dispensing
 - Monitoring and supervision

- A workshop will be held in Guangxi Province with key stakeholders to review the draft SOPs and solicit inputs from potential users.
- SPS will revise the SOP manual based on feedback from the workshop and produce a draft for field testing.
- Following completion of the SOP manual, SPS will develop training materials and deliver a training workshop on general pharmaceutical management for ARV medicines and SOP implementation.

The timeline for activities will be determined based on SPS and partner commitments.

ANNEX 1. LIST OF PERSONS MET

NCAIDS

- Dr. Fujie Zhang, Director, Division of Treatment and Care, NCAIDS, CDC
- Dr. Cui Yan, Director, Division of Laboratory and Logistics Management Department, NCAIDS, CDC
- Dr. Liu Xia, Doctor of Division of Treatment and Care, NCAIDS, CDC

WHO

- Dr. Connie Osborne, Senior Advisor of HIV/AIDS Care and Treatment
- Dr. Zhang Lan, National Programme Officer, HIV/AIDS

Guangxi Bureau of Health

- Dr. Chen Jie, Director, Division of AIDS Control

Guangxi Center for Disease Prevention and Control

- Dr. Liu Wei, Deputy Director
- Dr. Liang Fuxiong, Deputy Director of Division of AIDS Prevention and Control
- Dr. Liu Shuaifeng, Pharmacist, Division of AIDS Prevention and Control of Guangxi CDC
- Dr. Tang Zhirong, ARV Treatment Clinic Division
- Ms. Hu Yueying, nurse, ARV Treatment Clinic Division
- Ms. Liang Huanzhu, Pharmacist, Division of AIDS Prevention and Control

Guangxi Zhuang Autonomous Region Longtan Hospital

- Dr. Zhang Baoyu, Leader of Community Party, responsible for administration
- Dr. Li Yong, Deputy Director and Assist Professor, responsible for HIV/AIDS
- Dr. Lu Ruichao, Director of HIV Care Department, outpatients
- Dr. Meng Zhihao, Director for Internal Department (HIV Department), in charge of inpatients
- Ms. He Lichun, Director of Pharmacy Department
- Mr. Liao Jianning, Director of Pharmacy Department
- Mr. Qin Xiongzhi, Pharmacist, in charge of dispensing and management of ARVs
- Ms. Huang, Chief Nurse of HIV Department

Guilin City CDC and Guilin The Third People's Hospital

- Dr. Zhang Zhenkai, Deputy Director, Guilin CDC
- Dr. Chen Wei, Director of HIV/AIDS Department, Guilin CDC
- Dr. Wen Xiaoqing, Deputy Director of HIV/AIDS Department, Guilin CDC
- Dr. Zhou Meirong, HIV/AIDS Department, Guilin CDC
- Dr. Yang Jingyi, Deputy Director, Guilin The Third People's Hospital
- Mr. Qin Jusheng, Pharmacist, Director of Pharmacy Department, Guilin The Third People's Hospital

- Mr. Lee Hui, Deputy Director of Medical Administrative Department, Guilin The Third People's Hospital
- Dr. Wang Haiquan, Director of Internal Medicine Department, Guilin The Third People's Hospital

Heng County CDC and Heng County People's Hospital

- Dr. Lu Chanjian, Vice Director, Heng CDC
- Dr. Ma Guanghui, Director HIV/AIDS Department, Heng CDC
- Mr. Lu Wei, medicine manager, Heng CDC
- Ms. Deng Fuqiu, nurse at ART clinic, Heng People's Hospital
- Dr. Liang Feili, Director of Internal Medicine Department, chief doctor at ART clinic, Heng People's Hospital
- Mr. Su Yisheng, Director of Medical Administrative Department, in charge of ARV procurement, Heng People's Hospital,

Luzai County CDC and Luzai County People's Hospital

- Dr. Qin Guiguan, Deputy Director, Luzai BOH
- Ms. Qin Huiqun, Director of Division for Disease Control, Luzai BOH
- Dr. Fu Botao, Director, Luzai CDC
- Dr. Chen Xianjun, Deputy Director, Luzai CDC
- Dr. Yang Li, Director of Epidemiology Division, Luzai CDC
- Dr. Peng Wanfen, Epidemiology Division, Luzai CDC
- Dr. Qin Zhibin, Deputy Director, Luzai People's Hospital
- Dr. Luping, Director of Internal Medicine Department, Luzai People's Hospital
- Dr. Qin Daling, ARV Outpatient Clinic, Luzai People's Hospital
- Ms. Wu Gezhen, Nurse of ARV Outpatient Clinic, Luzai People's Hospital
- Ms. Liu Chengwen, Nurse of ARV Outpatient Clinic, Luzai People's Hospital

Liuzhou City CDC

- Dr. Gan Zhigao, Professor, Vice Director
- Dr. Liu Jinji, Director HIV/AIDS Control Department
- Dr. Feng Weidong, Deputy Director of HIV/AIDS Control Department
- Dr. Xiao Wenlian, Director of Tuberculosis Control Department
- Mr. Zheng Yuanjia, ARV drug manager, clinic physician
- Dr. Zhou Ping, Deputy Director of Tuberculosis Control Department,

Nanning, The Fourth People's Hospital

- Dr. Huang Shaolin, Director of Infectious Disease Department (including HIV/AIDS)
- Dr. Lan Jiang, Leader of Party Community
- Dr. Liang Dexiong, Deputy Director
- Dr. Wang Guangcai, Deputy Director of Medical Administrative Department
- Ms. Du Liqun, Nurse of Infectious Department
- Ms. Zhou Jieliang, Technician, Director of General Office
- Ms. Cen Haotao, Pharmacist, Medicine Manager

- Dr. Ban Xionghuan, Manager of Project Office

The Clinton Foundation, Beijing

- Ma Li, Procurement Manager
- Mei Zheng, National Program Manager
- Yves Marchandy, Senior Clinical Advisor

USAID

- Virginia Bourassa, HIV/AIDS Advisor

