Uganda Assessment:
Drug Management for Childhood Illness

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Acronyms

AMREF	African Medical and Research Foundation
ARI	acute respiratory infection
BASICS	Basic Support for Institutionalizing Child Survival [Project]
BCG	bacillus Calmette-Guerin
DADI	district drug inspectors
DAS	drug availability study
DDHS	District Director of Health Service
DISH	Delivery of Improved Services for Health [USAID]
DMCI	Drug Management for Childhood Illness
DPT	diphtheria, pertussis, tetanus
DUS	drug use study
EDLU	Essential Drug List for Uganda
IEC	information, education, and communication
IMCI	Integrated Management of Childhood Illness
INRUD	International Network for Rational Use of Drugs
MIP	median international price
MOH	Ministry of Health
MSH	Management Sciences for Health
NDA	National Drug Authority
NDP	National Drug Policy
NGO	nongovernmental organization
NMS	National Medical Stores
OPV	oral polio vaccine
ORS	oral rehydration salts
PAHO	Pan American Health Organization
PHN	population, health, and nutrition
RPM	Rational Pharmaceutical Management [Project]
STG	standard treatment guidelines
STI	sexually transmitted illness
UNEPI	Uganda National Expanded Program for Immunization
UNICEF	United Nations Children's Fund
WHO	World Health Organization

Executive Summary

The report of the Uganda assessment of drug management for childhood illness (DMCI) represents a prospective and retrospective assessment of drug availability and use that supports the implementation of Integrated Management of Childhood Illness (IMCI) in four regions in Uganda: Arua, Hoima, Kampala, and Kumi. The data yielded strengths and weaknesses of the national pharmaceutical supply system in Uganda. An Epi-Info software specifically designed for the DMCI was used for data entry and analysis.

Previously, the Management Sciences for Health (MSH) Rational Pharmaceutical Management (RPM) Project, in collaboration with the Pan American Health Organization (PAHO), the U.S. Agency for International Development (USAID), and the Basic Support for Institutionalizing Child Survival (BASICS) Project, developed an indicator-based tool, the *Drug Management for Childhood Illness (DMCI) Manual,* in response to the need for improving the management and use of drugs in the IMCI strategy. The purpose of the *DMCI Manual* is to assist health managers at the central and district levels identify problem areas in drug management that are critical for ensuring the availability and proper use of drugs and supplies essential to IMCI case management.

The *DMCI Manual* is designed to examine two critical areas of IMCI drug management: availability and use. The availability indicators investigate the state of the physical inventory and stocks, record keeping, and procurement prices. Inventory records are checked and compared with a physical check for a tracer list of drugs and supplies that are considered necessary to treat the five major childhood conditions: acute respiratory infection (ARI), diarrhea, malaria, measles, and malnutrition. Drug use data were collected through a review of documents and hospital records, prescribing patterns of the health worker, structured interviews, and simulated purchases in the private sector.

The objectives of the Uganda DMCI assessment were as follows:

- Introduce and adapt the DMCI tool to the Ugandan health setting
- Assess availability of drug and medical supplies essential for the implementation of the IMCI strategies
- Recommend interventions to improve drug supply and the drug management system

Drug Availability

All the drugs on the tracer list were on the Uganda essential drug list, which suggested that the Uganda IMCI treatment protocols followed the national standard treatment protocols. The study found that the Ministry of Health (MOH) through its procurement agency, the National Medical Stores (NMS), purchased the majority of the drugs and supplies in the international market in the previous year at prices below the median international procurement price (74%). In the surveyed facilities, 66 percent of the tracer drugs were available. Bacillus Calmette-Guerine (BCG), oral polio vaccines, and measles vaccines were available in all the facilities that were surveyed. The incidence of individual drug stock-outs during the previous 12 months was on average 32

percent. Amoxycillin 250mg tablets were out of stock 70 percent of the time, cotrimoxazole 120mg tablets 42 percent of the time, and folic acid 5mg tablets 71 percent of the time. Those three drugs are essential, and their low availability, especially at the health centers, should be a cause of concern. Supplies such as nasogastric tubes and thermometers were out of stock 77 percent and 61 percent of the time, respectively. The inventory records of 66 percent of the surveyed health facilities did not correspond with physical stock.

On a positive note, the study found that 24 refrigerators (96%) surveyed for storage of vaccines were functional and had up-to-date refrigerator-monitoring cards.

Drug Use

Only 50 percent of the surveyed health facilities had any reference material on treatment guidelines. Upon further investigation, the data collectors were informed that the Uganda standard treatment guidelines (STG) had not been updated for several years and a new and updated draft was undergoing a technical review. However, most clinics had at least one Uganda IMCI manual.

Seventy-three percent of all case records that were reviewed received at least one antibiotic while 45 percent of all “patients” received at least one antibiotic in simulated purchases in drug retail outlets.

Pneumonia and no-pneumonia (cough and cold), diarrhea, and malaria were the three IMCI diseases that were investigated. Of the no-pneumonia records that were surveyed, 91 percent of cases were prescribed an antibiotic. Only 58 percent of the pneumonia cases received the appropriate antibiotic. In simulated purchases in drug retail outlets for no-pneumonia symptoms, 55 percent of cases received an antibiotic. Clearly, these results suggest that an urgent need exists to reeducate the health and pharmacy workers on the use and management of antibiotics and to improve their diagnostic and dispensing skills. The most obvious danger that could result from those irrational practices is the development of antimicrobial resistance to the most commonly used antibiotics in child health such as cotrimoxazole, ampicillin, and chloramphenicol.

Seventy-four percent of all observed and retrospective case records received oral rehydration salts (ORS) to treat simple diarrhea. However, at least 66 percent showed that antibiotics were prescribed simultaneously. Only three cases (0.43%) received an antidiarrhea preparation. Upon further investigation of this pattern, the prescribers said that they preferred to prescribe an antibiotic to avoid missing out on a serious case of diarrhea and additional expenses for the caretakers by returning to the health facilities if the symptoms persist. In the simulated purchases for simple diarrhea, antidiarrhea drugs were recommended in 30 percent, ORS in 20 percent, and an antibiotic in 85 percent of all simulated cases.

The appropriate prescription for malaria was also reviewed. Seventy-five percent of malaria encounters diagnosed in health facilities were prescribed an appropriate oral antimalarial according to IMCI treatment guidelines, compared with 63 percent in private drug outlets. Malaria protocol treatments were best followed in urban health centers (83%).

The study attempted to compare the cost of drugs for no-pneumonia, diarrhea, and malaria when IMCI treatment norms were not followed with the cost of drug treatment when IMCI treatment norms were followed. On average the cost of non-IMCI treatment was seven times higher. The study showed that the average cost for treating no-pneumonia encounters was 3 times higher, malaria almost 190 times higher and for diarrhea 5 times higher when compared with IMCI standard treatment norms. The cost of treating diarrhea in the private sector was 161 times more expensive while malaria was eight times higher. Clearly the nonadherence to IMCI protocols is costly for the national supply system and for out-of-pocket expenditures of the caretakers. Significant cost savings can be achieved if protocols are adhered to. These findings emphasize the need for a follow-up in diagnostic training combined with rational use and prescribing education.

In total, 555 drugs were prescribed. Eighty-seven percent were dispensed as prescribed. Although this result shows that the drugs were available most of the time, the data collectors noted that the prescribers knew what was in stock at the pharmacy and prescribed accordingly. A similar result was achieved in the private sector. Of the 119 drugs prescribed in the simulated private purchases, 117 or 98 percent were actually dispensed as prescribed. The National Drug Policy (NDP) in Uganda does not allow health center personnel to use several IMCI referral drugs, such as quinine and gentamicin injectables.

IMCI training in case management emphasizes the need for the health worker to ask a number of critical questions about the severity of the disease. Of the 189 health workers who were either observed or interviewed, only 61 percent asked clinical questions to determine the severity of the disease. Only 16 percent of the staff in drug retail outlets asked similar questions.

The survey also looked at the health worker dissemination of drug information. Of the 202 caregivers who were interviewed at the exit of the health facilities, only 46 percent were able to describe correctly the prescribed medication. Only 60 percent of the health workers provided information on how to take prescribed medications. In drug retail outlets 69 percent of the staff provided some drug information. Sixty-three percent of the health workers provided information to caregivers on signs of progressive illness and recommended that the patient visit a medical officer or a clinic if the symptoms reappear. Only 5 percent of pharmacy staff in drug retail outlets told caretakers about signs of progressive illness.

Conclusions

In spite of the financial and human constraints at the MOH in implementing IMCI strategies, the MOH managed to show positive results in reducing the burden of infant disease. Uganda is leading the way in health reforms and decentralized management of health services. The achievements made so far in IMCI should be improved and expanded upon as the reforms take root at all levels of the health care system. The study clearly indicates that the drug management system is weak, especially at the periphery, and that capacity needs to be strengthened in all areas of the supply chain management, such as inventory and stores management, quantification, rational drug use, consumption patterns, and logistics management information systems.

Although drug prices were found to be below the average median international prices, these cost savings gains are quickly eroded by the irrational prescribing habits and use of the drugs by the health workers. Unless prompt measures are taken to improve the prescribing habits and the use of drugs, there is little doubt that Uganda could face a more serious problem of resistance to important and inexpensive antimicrobial drugs. And, unless drastic measures are taken to improve the overall management of drug supplies, the gains that have been achieved so far could be lost and even reversed.

Recommendations

Drug Policy

1. Update the national drug policy through dialogue with IMCI stakeholders.
2. Allow health center personnel to use IMCI referral drugs. This policy will surely reduce the risks and costs of over-referring patients to the hospital and will save children's lives.

Capacity Building

1. Design district-focused capacity building and training in drug management, the inventory control system, and rational use to improve availability and use of essential drugs. The approaches should include the public and private sector collaboration particularly with nongovernmental organizations (NGOs), community-based committees, and religious associations.

2. Design and equip managers with simple tools (i.e., forms) to monitor inventory of critical IMCI supplies by introducing small-scale supply information and control systems, and devise communication systems between the district center and health centers.

3. Improve the health workers' skills in drug information by integrating drug management and rational drug use training into the IMCI training plan. The MOH at the central level should train personnel and create a core network of trainers that should join the IMCI trainers. The training in drug management should be targeted to the different categories of health workers at the health centers, including the community-based health workers.

4. Include DMCI indicators in the monitoring and evaluation of the health system performance.

Case Management and Rational Drug Use

1. Disseminate the national STG and IMCI treatment protocols.

2. Introduce easy-to-read drug management and rational drug use flow charts and posters in the health centers and drug retail outlets.

3. Reduce use of antibiotics and injections through community-based information, education, and communication campaigns. The authors also recommend working closely with community heads and community health committees to reduce the overuse of drugs and injections.

4. Establish district drug and therapeutic committees to monitor adherence to treatment protocols and costs of treatments at all levels. Promote the use of a simple costing tool at all levels.

Integrated Management of Childhood Illness

The World Health Organization (WHO) and the United Nations Children's Fund (UNICEF) collaborated to develop the Integrated Management of Childhood Illness (IMCI) strategy, which aims to reduce global mortality and morbidity for the leading causes of childhood illness—

- Acute respiratory infection (ARI)
- Diarrhea
- Malaria
- Malnutrition
- Measles

IMCI helps health workers diagnose these conditions, provide standard treatments and follow-up, and promote preventive measures. Each country that chooses to implement an IMCI program adapts the treatments and guidelines to the local setting to ensure that the most effective and cost-efficient treatment for each diagnosis is available. The necessary precondition to IMCI success is the availability of drugs and supplies.

A 1996 indicator-based study conducted in three Central Asia Republics by the Rational Pharmaceutical Management (RPM) Project found that drugs and medical supplies essential to proper implementation of IMCI strategies were not readily available in government health facilities and that treatment costs were higher as a result.

With this finding in mind, the Drug Management for Childhood Illness (DMCI) assessment tool was developed by RPM in collaboration with the Pan American Health Organization (PAHO), the U.S. Agency for International Development (USAID), and the USAID-funded Basic Support for Institutionalizing Child Survival (BASICS) project. DMCI complements the IMCI strategy by assessing the availability and use of IMCI drugs, helping plan and monitor implementation of IMCI, and improving IMCI drug management. DMCI uses a comprehensive rapid assessment methodology with three components—

- Assessment manual
- Data collector's guide
- DMCI software program based on Epi-Info

The DMCI methodology is based on 20 indicators to evaluate drug availability and use. The reference manual includes four supplemental indicators that are optional. Combined, the indicators describe the degree to which drug availability and use affect IMCI implementation in the country being studied. The data collected are entered into an Epi-Info–based software program specifically designed for DMCI.

In November 1999 RPM conducted a workshop in Dar es Salaam, Tanzania, to present the latest version of the DMCI. The meeting included stakeholders from Uganda, Zambia, and Tanzania

and representatives of several bilateral and multilateral organizations, including the WHO headquarters and Africa regional offices, the World Bank, UNICEF, and TEHIP, a Tanzanian nongovernmental organization (NGO). The participants discussed ways to adapt the tool to meet IMCI drug management requirements in Africa. The comments from this group were included in the version of the tool that was used for the Zambia and the Uganda DMCI assessments.

This report presents the results and background of the DMCI in Uganda application. The assessment was conducted in Uganda during March and April 2000. The data were reviewed by the DMCI coordinator and were entered into the appropriate Epi-Info software in Kampala. The data were further tested and reviewed by RPM in Arlington, Va.

Uganda Health Situation

During the war and civil strife that engulfed Uganda in the 1970s and early 1980s, health services in the country suffered enormously and almost faced a total collapse. The current government took power in 1985 and quickly devolved the administrative and political power to the districts and villages. These local units have taken on responsibilities for education, health, and local infrastructure. Despite these efforts and successful outcomes in certain areas such as the fight against the HIV/AIDS epidemic, Ugandan health status and indicators remain poor. Malaria, for example, remains the main source of ill health, and life expectancy at birth declined from 48 years in 1980 to 42 years in 1997 (see Table 1).

Table 1. Key Health Indicators in Uganda and Sub-Saharan Africa

Health Indicators*	Uganda	Sub-Saharan Africa
Life expectancy at birth	42 years	51 years
Infant mortality (per 1,000 live births)	99	104
Under-five mortality (per 1,000 live births)	162	169
Underweight prevalence in under-fives	26%	30%
Maternal mortality (per 100,000 live births)	550	975
Total fertility rate	6.6	5.5
HIV prevalence (15–49 years old)	14.5%	8.8%**

*Source: *World Development Report 1999/2000*, World Bank.

**Source: "Regional HIV/AIDS Statistics and Features, end of 2000." Page 5 in USAID/WHO. December 2000. Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS/00.44E–WHO/CDS/CSR/EDC/2000. 9. Geneva:WHO.

Uganda Drug Management System

Ministry of Health

The responsibility of managing and regulating the pharmaceutical sector is in the hands of the Ministry of Health (MOH) and the National Drug Authority (NDA). The Principal Pharmacist manages the office at the MOH. In theory this office is in charge of implementing all the action plans of the pharmaceutical sector. In practice, however, the NDA seems to have taken upon itself several MOH responsibilities such as the training of the district health workers in quantification methods and rational drug use. The NDA is also in the process of updating the essential drug list and the standard treatment guidelines.

National Drug Authority

The NDA is the governmental body in charge of implementing regulations and laws that guarantee the quality, safety, and efficacy of all pharmaceutical and medical products produced or imported into Uganda. Drug registration is the major element of pharmaceutical legislation that helps ensure that safe and efficacious drugs of good quality are used in Uganda. The NDA is a well-organized institution with several pharmacists on board. In addition to its regulatory responsibilities, the NDA trains and monitors the district drug inspectors (DADI).

National Medical Stores

The National Medical Stores (NMS) is the MOH agency for procurement, storage, and distribution of the essential drugs and medical supplies. The NMS was established as a statutory corporation by an act of Parliament, ensuring an autonomous organization with the required government control. Duties and responsibilities of the MOH, board of directors, and management are defined in the statute. The NMS is the largest organization that works in drug procurement, storage, and distribution in Uganda.

The infrastructure and capacity of the NMS are very impressive. Storage at the facility includes space for 3,200 pallets (5,440 m^3 total storage space), including a new storage structure that has just opened. The new warehouse building on the grounds of the facility will help reduce the efficiency in storage space for the large consignment of drugs and medical supplies now in stock. Cold-storage capacity includes two portable walk-in stores that contain space for 14 pallets. Staffing of NMS is adequate and includes 131 employees in nine different departments.

Joint Medical Stores

The Joint Medical Stores (JMS) is a nonprofit warehouse that provides drugs and medical supplies primarily for the NGO community in Uganda. The JMS serves the drug and medical supplies needs of the NGO community. Current stock is estimated at US$1.5 million, and inventory turns over approximately five times a year. JMS uses Navision, an excellent system of computer inventory management. This program was developed jointly for the NMS and JMS to manage inventory procurement, distribution, and accounting information and to generate reports.

Applying the DMCI Tool in Uganda

The IMCI strategy was first implemented in Uganda in the early 1990s. To date, several districts are implementing all components of the IMCI strategies. Following the Tanzania meeting, RPM agreed with the Uganda delegation to introduce the DMCI concept and assessment in Uganda.

With the national IMCI coordinator's approval, the USAID/Uganda mission, RPM, and key Uganda stakeholders met in Kampala before conducting the assessment. This step is critical to laying the groundwork for the DMCI assessment because it helps build consensus around the concept of the tool; explain its usefulness in promoting IMCI strategies; and review the DMCI indicators, assess their suitability, and adapt them as required. This stakeholders' meeting was held in February 2000.

The participants included several MOH officials and the MOH Child Health Division, the NDA, University of Makerere, the NMS, the JMS, WHO, African Medical and Research Foundation (AMREF), AFRICARE, CARE, DISH II project, the Malaria Center, other NGOs, and other organizations supporting the management of childhood illnesses.

Dr. P. Stephenson of WHO chaired the meeting. Michael Gabra of RPM facilitated the discussions and explained the background and concept of the tool as well as the rationale behind each of the 20 DMCI indicators. The participants discussed the applicability of the tool in Uganda and its usefulness in supplementing a number of other existing IMCI assessment tools.

Methodology

Study Design

The DMCI tool is designed to assess two drug management outcomes—availability and appropriate use—affecting the implementation of IMCI in four different public and private settings:

- Central level
- Regional levels
- Health facilities
- Drug retail outlets

The DMCI study was designed to answer certain questions about drug availability and use, as described in the following paragraphs.

Drug Availability

The drug availability indicators allow investigators and key decision makers at the central and regional levels to identify the factors related to low availability of drugs and medical supplies, as well as the opportunities for improving the supply system. These indicators will be used to guide efforts in planning interventions to ensure that drugs and medical supplies are available in the public and private sectors. The drug availability indicators attempt to answer the following questions:

1. Are the drugs and medical supplies required to treat children under five years of age available in public health facilities?

2. If they are not available in the public sector facilities, are they available and affordable (based on average prices) in the private sector?

3. What are the determinants of product availability in the public sector (that is, the performance of the system)?

For the Uganda assessment, the drug availability study (DAS) assessed the availability of the drugs and medical supplies (including vaccines) needed to treat children as outpatients for five IMCI conditions. In an ideal scenario, the availability of these drugs and medical supplies would have been assessed before introducing the IMCI concept in the country. The data collection techniques for the drug availability study included document review, structured interviews, and physical inventory checks.

Drug Use

The purpose of the drug use study (DUS) is to review prescribing practices for IMCI health problems and assess their clinical and cost implications. The DUS targeted MOH facilities and drug retail outlets and used two methods of data collection: retrospective collection through records review and prospective collection through observation, interviews, and simulated purchases. The retrospective component of the prescribing study looked at facilities' records on acute respiratory infections and diarrhea, while the prospective component covered all five IMCI conditions. The drug use indicators attempt to answer the following questions:

1. What are the current prescribing practices for the five major childhood illnesses?

2. Are the current prescribing practices clinically appropriate?

3. How does the actual drug cost of current practices for treating IMCI health problems compare to what the estimated cost would be if IMCI treatment guidelines were followed?

DMCI Indicators

The DMCI is an indicator-based tool that measures performance of a particular aspect of the IMCI drug supply system. RPM and its collaborators designed a set of 20 indicators to review and analyze the drug management aspects of implementing IMCI programs. The 20 indicators are divided into 7 drug availability indicators and 13 drug use indicators, which are listed below and can also be found in Annex 1.

Drug Availability Indicators

1. Percentage of DMCI tracer drug products on the National Drug Formulary (NDF)/Essential Drug List (EDL)

2. Percentage of the median international price paid for a set of DMCI tracer drugs that were part of the last regular MOH procurement

3. Average percentage of a set of unexpired DMCI tracer drugs available in MOH storage and health facilities

4. Average percentage of time out of stock for a set of DMCI tracer drugs in MOH storage and health facilities

5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MOH storage and health facilities

6. Percentage of MOH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage

7. Percentage of MOH storage and health facilities with up-to-date refrigerator temperature monitoring records

Drug Use Indicators

Thirteen indicators describe drug use practices for IMCI health problems and assess their appropriateness and cost implications. For the Uganda assessment, ARI was subdivided into the categories of pneumonia and no-pneumonia (cough and cold).

1. Percentage of MOH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines

2. Percentage of encounters diagnosed as no-pneumonia (cough or cold) that are prescribed antibiotics

3. Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines

4. Percentage of encounters diagnosed as diarrhea that are prescribed ORS

5. Percentage of encounters diagnosed as diarrhea that are prescribed antidiarrheals

6. Percentage of encounters diagnosed as non-dysentery/non-cholera diarrhea that are prescribed antibiotics

7. Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines

8. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed

9. Percentage of prescribed drugs actually dispensed

10. Percentage of caregivers who could correctly describe how to give the prescribed medication

11. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem

12. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs

13. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a doctor or clinic visit if the signs appear

Data Collection

Table 2 summarizes the data collection methods used for the Uganda DMCI assessment.

Table 2. Data Collection for Uganda DMCI Assessment

Study	Data Collection Technique	Public Sector MOH Facilities	Private Sector Drug Retail Outlets
Drug Availability	Document review	X	X
	Structured interview	X	
	Physical inventory	X	
Drug Use	Patient medical records review, direct observation, and exit poll interviews	X	
	Simulated purchase (without prescription)		X

Training Data Collectors

As mentioned earlier, a Uganda DMCI coordinator oversaw the entire DMCI assessment (training, data collection, and data entry). The study required 17 data collectors. The DMCI coordinator and the MOH Child Health Unit in liaison with the RPM consultant chose the data collectors. The data collectors, who were medical officers, pharmacists, pharmacy technicians, midwives, nurses, and clinical officers, were from both public and private institutions. Some of the data collectors were trained in IMCI. See Annex 2 for a list of data collectors.

The data collectors were grouped into four data collection teams. Descriptive key health indicators and other relevant information were summarized and discussed with data collection teams. Each team prepared a workplan and budget to complete the data collection. One person from each team was designated as team leader responsible for overseeing data collection and for maintaining communications with the DMCI coordinator. The team leader was also responsible for introducing the team at each health facility and explaining the purpose of the visit.

Training and Simulated Assessment

As part of the training, data collectors were sent out to conduct a one-day pilot study in Mukono District, visiting retail outlets and several urban health centers. Lessons learned from the pilot testing were used to complement the training.

The data collection was piloted in Mukono District on the third day of the training. Lessons learned were used to further improve the forms. In addition to DMCI indicators the Ugandan DMCI Team added a few more question to the data collection forms. The main changes involved “Vaccine Data Form” (DAS-4), “Observation of Health Worker Data Form” (DUS-2), and “Exit Poll Interview Form” (DUS-4). A new form on Storage Conditions (DAS-6) was introduced. The added information and changes did not affect the software program and analysis.

After compiling the pilot results, the data collectors decided to decrease the tracer drug list from 45 to 34 drugs, vaccines, and medical supplies.

Local Coordinator

A coordinator from the southern Africa region familiar with drug management and IMCI in Zambia oversaw the entire DMCI process (training, data collection, and entry). He also coordinated a similar assessment in Zambia. A Ugandan Ministry of Health official designated by the national IMCI coordinator assisted him.

Team Leader/Managers Concept

A team leader was appointed for each of the four data collection groups. The role of the team leader was to supervise the team and coordinate the data collection exercise in the field.

Before data collectors departed for the study sites, arrangements were made for them to contact the coordinators for any assistance or clarification and advice that they may have needed while in the field. Where possible, units for cellular phones were secured for data collectors. In situations with no access to cell communications, radio communications were encouraged.

Site Selection and Sample Size

The DMCI manual provides a detailed discussion on the random selection process of sites. In Uganda attempts were made to include facilities representing all variants of the overall system. Four districts were chosen based on geographical, socioeconomic, population density and to a lesser degree on the level of IMCI implementation. The four districts that were selected were Arua, Hoima, Kampala, and Kumi. Following the selection of the sites, the DMCI coordinator contacted and visited each of the district health management offices to seek their approval to participate in the assessment.

Health Facilities

The sample size for the study was 20 facilities, five from each of the selected districts. Health facility selection was based on DMCI guidelines. The district hospital outpatient unit was selected in each study district. Four other facilities were randomly chosen. However, in some districts, samples were higher because of the multiple storage sites that some district hospitals operated. Table 3 illustrates the type of facilities that were surveyed.

Table 3. Types of Facilities

Facility Type (Epi-Info Label)	Description	Type of Services (Uganda MOH Category)	Staffing
BAS	Basic Health Center (rural)	II (outpatients only)	Without doctor
CLIN 1	Health Center (rural or urban)	IV (Health Center services)	With doctor
CLIN 2	Health Center (rural or urban)	III (with maternity services)	May have a clinical officer
HOS 2	District Hospital (rural or urban)	All services	With doctor
RMS	District Medical Stores	Storage & distribution	Without doctor

Drug Retail Outlets

The DMCI DUS assessment included a survey of drug retail outlets. According to the Uganda National Drug Authority, there are at least 187 wholesale and retail pharmacies in Kampala, which means almost 75 percent of the pharmaceutical market is in the capital. The DMCI team listed the drug retail outlets located near the assessment sites and selected those that were the closest to the health facilities.

Patient Encounter Samples

Approximately 600 patient records per IMCI health problem studied were reviewed for the retrospective portion of the DMCI assessment. The rationale for collecting this sample size is based on the following assumptions:

- The study design is intended to estimate percentage indicators that summarize values for the whole sample with 95 percent confidence interval, and plus or minus 7.5 percent error.

- For statistical computation reasons, the sample size required for this assumption should be a minimum total of 600 medical records for each IMCI health problem. This total is achieved by randomly selecting 30 medical records for each IMCI problem in each of the 20 health facilities.

- Experience has shown that the results of collecting larger samples are not more useful for identifying the main problems, and therefore do not justify the increased time, cost, and effort.

Classification of Illness

The coordinators and the data collectors agreed to classify illnesses using local language terminology. The team discussed the terms used for the different conditions or symptoms and developed a standard list to be used in each district visited. The list was translated to local languages for the teams' use.

Simulated Purchases

Simulated purchases were conducted to assess dispensing in private pharmacies. Pharmacy owners and personnel are often suspicious of assessment activities. Therefore, the data collectors were instructed to use local residents when conducting simulated purchases, especially in rural areas, and to limit their inquiries to a few preselected questions, preferably using local languages.

Data Processing and Analysis

The questionnaire and forms were coded per geographic site and entered into Epi-Info software (version 6.0) by a local consultant trained by RPM staff. The data were reentered into the software and analyzed by RPM staff in Arlington, Va.

Interpretation of Findings

This section discusses the findings of the drug availability and drug use assessments. When records were not complete the facilities were excluded. Thus, the number of facilities surveyed varies from indicator to indicator.

Drug Availability Study

Indicator 1. Percentage of DMCI tracer drug products on the National Drug Formulary (NDF)/Essential Drug List (EDL)

The WHO IMCI model treatment guidelines have been used to develop a standard list of drugs that should be available locally to treat the most common childhood illnesses. This indicator is a measure of the ability of the system to support IMCI.

The DMCI tracer list was developed during the training workshop in collaboration with the MOH and the data collectors. The tracer list is a compilation of the drugs included in the standard treatment guidelines for IMCI in Uganda. There are 34 products on the DMCI tracer list (25 drugs, 4 vaccines, and 5 supply items). See Annex 4 for the complete list.

Except for the vitamin A 100,000IU tablet and the paracetamol syrup 120mg/5ml, all the drugs on the tracer list are on the Essential Drug List for Uganda (EDLU) (1996). However, because the vitamin A 200,000IU and the paracetamol tablet 500mg are on the EDLU, the survey team agreed to use all dosage forms and strengths available, whether a particular "pediatric" strength or form was available or not. Using this interpretation of the indicator, all the drugs on the DMCI tracer list are on the EDLU.

Indicator 2. Percentage of median international price paid for a set of DMCI tracer drugs that were part of the last regular MOH procurement

The procurement system in Uganda is managed by the NMS for the MOH. The NMS has the official responsibility for procurement at the central level in the public health sector, including the procurement and management of donated drugs such as the kits for the rural health centers.

In general, the NMS received prices from suppliers that were significantly less than the median price in the international market. The lead time for procured drugs is 8–10 months (and sometimes longer) with the use of open tenders. This lead time is relatively long and may contribute to many problems at the NMS, including stock-outs, overstocking, emergency purchases from local suppliers, and forecasting of accurately needed supplies.

Indicator 2 is calculated by comparing the most recent MOH/NMS acquisitions price for a set of tracer drugs to the median procurement price. The median international procurement prices were obtained from the *International Drug Price Indicator Guide* published by MSH in 1999. In 1998–99 the MOH paid on average 74 percent of the median international price (MIP) for the set of IMCI tracer drugs. Of the 34 products listed, 12 products (29.2%) were purchased above the median procurement price (see Table 4). The highest acquisition prices were recorded for the two strengths of folic acid tablets, nalidixic acid 500mg tablets, and Ringer's lactate intravenous solution. The remaining 22 products, or 70 percent, were purchased for less than the median procurement price.

Table 4. Drugs Purchased above the MIP at the Time of the Study

Name	Strength	Form	Percent above the MIP
Chloramphenicol	1,000mg	ampoule	10
Cotrimoxazole	120mg	tablet	28
Ferrous sulfate	20mg/ml	syrup	8
Ferrous sulfate	60mg	tablet	15
Folic acid	1mg	tablet	61
Folic acid	5mg	tablet	105
Gentamicin	40mg/ml	ampoule	4
Nalidixic acid	500mg	tablet	110
Paracetamol	500mg	tablet	7
Quinine	300mg/ml	ampoule	3
Ringer's lactate	500ml	500ml	118
Vitamin A	200,000IU	tablet	25

The open tender bulk purchasing schemes used by the NMS contribute to keeping prices down. Some of the products with inflated prices were purchased locally on a small scale. This situation suggests that current acquisition prices on products purchased in bulk in the international markets can be contained by taking advantage of competitive markets and by achieving economies of scale. International competitive tenders are done for the majority of drugs purchased under bilateral and multilateral agreements.

Indicator 3. Average percentage of a set of unexpired DMCI tracer drugs available in MOH storage and health facilities

This indicator calculates the level of availability of the DMCI tracer drugs and supplies at the time of the study. In a survey of the sites in the sample, an average of 66 percent of the drugs on the tracer list were found in stock in government facilities at the time of the study. Table 5 lists the percentage of stock available at each type of facility.

Availability of the drugs in the periphery depended partly on the distribution schedule from NMS to the district and from the district to the lower level units. The NMS sends the drugs to the districts in prelabeled kits bearing the name of each recipient health unit. The districts receive

three types of kits—the essential drugs kit, the supplementary kit, and the sexually transmitted illness kit. In principle, these kits are delivered quarterly and the vaccines are delivered every month by the Uganda National Expanded Program of Immunization (UNEPI). Distribution within the district is the responsibility of the District Director of Health Service (DDHS).

Table 5. Stock Availability

Facility Type	Average % of Tracer List Available
BAS	71
CLIN 1	58
CLIN 2	68
HOS 2	75
RMS	58

The findings in Table 6 show low availability of several antibiotics such as amoxicillin 250mg tablet (18%), chloramphenicol 10mg/amp (29%), and gentamicin 40mg/ml (27%). Other products that were low at the time of the study were folic acid 5mg tablet and vitamin A 200,000IU. Nalidixic acid 500mg tablet was not available in all facilities. However, most of the vaccines in the tracer list were available, as shown in Table 7.

Table 6. Availability of IMCI Tracer Drugs for All Facilities

IMCI Tracer List	Average % of Stock Availability
Amoxycillin, 250mg/tab	18
Benzyl penicillin 1MU/vial	82
Chloramphenicol 100mg/amp	29
Chloroquine 150mg/tab	100
Cotrimoxazole 120mg/tab	59
Cotrimoxazole 480mg/tab	92
Erythromycin 250mg/tab	91
Ferrous sulfate 60mg/tab	75
Folic acid 1mg/tab	65
Folic acid 5mg/tab	22
Gentamicin 40mg/ml	27
GV paint 25 grams	65
Injection water, 10ml/ amp	100
Intravenous cannula pack/piece	43
Intravenous sets, pack	77
Mebendazole 100mg/tab	87
Nalidixic acid 500mg/tab	0
Nasal gastric tube, pack	23
Needles (21-23G), pack/piece	91

Table 6. Availability of IMCI Tracer Drugs for All Facilities (cont.)

IMCI Tracer List	Average % of Stock Availability
Oral rehydration salts	83
Paracetamol 500mg /tab	83
Quinine 300mg/ml	54
Rectal diazepam 5mg/sup	46
Ringer's lactate 500ml	65
Sodium chloride 500ml	3
Sulphadoxine/pyrimethamine 525mg/tab	71
Tetracycline eye ointment 1%	75
Thermometer pack/piece	35
Vitamin A 100,000IU/tab	61
Vitamin A 200,000IU/tab	50

Table 7. Vaccine Availability for All Facilities

Vaccine Type	Average % Available
Bacillus Calmette-Guerin, 10dose/amp	100
Diphtheria-Pertussis-Tetanus, 20 dose/amp	96
Measles vaccine, 20 dose/amp	100
Polio	100

Indicator 4. Average percentage of time out of stock for a set of DMCI tracer drugs in MOH storage and health facilities

A complementary indicator of availability is the absence of stock-outs during a period of time. This indicator allows for a more robust analysis of the stock situation over time, together with indicator 3. In contrast to indicator 3, which looks at a specific moment in time, this indicator provides a measure of a procurement and distribution system's capacity to maintain a constant supply of drugs. For the IMCI tracer list, the target time out of stock should be 0 percent, or no stock-outs.

In the surveyed MOH facilities, individual items of a set of the IMCI tracer list were out of stock 32 percent of the time during the previous 12 months. The overall range per product was from 0 percent (all vaccines) to 71.3 percent (folic acid).

The facility-specific out-of-stock averages are listed in Table 8.

Table 8. Average Percentage of Days Drugs Were Out of Stock, by Facility Type

Facility Type	Average % of Days Out of Stock
BAS	27.4
CLIN 1	37
CLIN 2	29.4
HOS 2	21.4
RMS	43

These findings indicate that stock levels are not constant over time in any of the surveyed facilities. However, district hospitals reported the lowest stock-out times of all facilities, which is significant because hospitals see most of the IMCI cases. Another significant result is the average time out of stock in the district stores (43%). The average percentage of time out of stock for a set of IMCI tracer drugs is shown in Table 9.

Table 9. Percentage of Days Out of Stock for a Set of IMCI Tracer Drugs

IMCI Tracer List	Average % Days Out of Stock
Amoxycillin, 250mg/tab	70.5
Benzyl penicillin 1MU/vial	14
Chloramphenicol 100mg/amp	56.9
Chloroquine 150mg/tab	6.5
Cotrimoxazole 120mg/tab	41.4
Cotrimoxazole 480mg/tab	16.9
Erythromycin 250mg/tab	32.6
Ferrous sulfate 60mg/tab	20.3
Folic acid 1mg/tab	31
Folic acid 5mg/tab	71.3
Gentamicin 40mg/ml	70.6
GV paint 25 grams	18
Injection water 10ml/ amp	1.6
Intravenous cannula pack/piece	52.7
Intravenous sets, pack	23.8
Mebendazole 100mg/tab	11.6
Nalidixic acid 500mg/tab	94
Nasal gastric tube, pack	77
Needles (21-23G), pack/piece	10
Oral rehydration salts	5.7
Paracetamol 500mg /tab	14.6
Quinine 300mg/ml	36.5
Rectal diazepam 5mg/sup	47
Ringer's lactate, 500ml	34.4
Sodium chloride 500ml	58.6
Sulphadoxine/pyrimethamine 525mg/tab	27.3
Tetracycline eye ointment 1%	14.3
Thermometer pack/piece	60.8
Vitamin A 100,000IU/tab	29.7
Vitamin A 200,000IU/tab	60

Indicator 5. Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MOH storage and health facilities

This indicator serves as a crosscheck to monitor the integrity of stock records. For this indicator, the data collectors were instructed to talk with store managers and to give them some time to update their records before the collection of data. None of the health centers has a computerized record-keeping system and to our knowledge only two public health facilities, NMS and JMS, have a computerized inventory system.

The average percentage of IMCI tracer drugs, vaccines, and supplies that corresponds exactly with the physical counts is a measure of the quality of the stock record-keeping system. In all facilities surveyed, for a set of the 34 IMCI tracer-list drugs, vaccines, and supplies, only 34 percent of stock records corresponded with the physical count. Low percentages of correspondence between stock records and physical counts may be caused by wastage or pilferage and highlight problems of accountability, all of which contribute to financial losses. Table 10 lists the rates for each type of facility.

Table 10. Average Percentage of Stock Records That Correspond with Physical Counts, by Facility Type

Facility Type	Average % of Records Corresponding with Supplies
BAS	33
CLIN 1	39
CLIN 2	30
HOS 2	25
RMS	39

Indicator 6. Percentage of MOH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage

Each health facility in the sample of 24 was surveyed and each had at least one working refrigerator (100%). The data collectors physically inspected the appliances to see if the following conditions were met:

- The condition of the refrigerator was either fair or good.
- The refrigerator had both a freezer watch indicator and a thermometer inside.
- The temperature at the time of inspection was between 2°C and 8°C.
- The refrigerator did not contain any food or drinks.

If any of these conditions were not met then the health facility was considered not to have a working refrigerator. The data collectors were not asked to check if the facilities had cold boxes

or ice packs because those factors were outside the scope of this study. Table 11 shows the number of facilities with a working refrigerator.

Table 11. Availability of Working Refrigerators, by Facility Type

Facility Type	Number of Facilities Surveyed	% with Working Refrigerator
BAS	6	100
CLIN 1	6	100
CLIN 2	4	100
HOS 2	4	100
RMS	4	100

Indicator 7. Percentage of MOH storage and health facilities with up-to-date refrigerator temperature monitoring records

Of the 24 facilities surveyed, 96 percent had up-to-date refrigerator temperature monitoring cards. Results are broken down by facility type in Table 12.

Table 12. Refrigerator Temperature Monitoring, by Facility Type

Facility Type	Number of Facilities Surveyed	% with Up-to-Date Cards
BAS	6	100
CLIN 1	6	100
CLIN 2	4	75
HOS 2	4	100
RMS	4	100

These findings, combined with those of indicator 6, indicate that all health facilities had at least one working refrigerator at the time of the survey and that they were consistent at monitoring the refrigerator temperatures. Only one facility did not maintain an up-to-date temperature chart. A break in recording of more than one day means that the facility does not have an up-to-date monitoring chart and does not follow WHO recommendations to monitor temperature at least twice a day.

Drug Use Study

Indicator 1. Percentage of MOH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines

These indicators measure the presence of an official treatment manual and level of access to information to promote effective care and management of sick children on the basis of standard treatment guidelines. The discussion below is divided into a review of the availability of the standard treatment guideline manual and the IMCI guidelines.

Standard Treatment Guidelines

Most health workers told the data collectors that they had at least one copy of a clinical reference guideline. However, for the purposes of this indicator, the data collectors only counted manuals if they were physically present and intended as a clinical reference for health care providers. Of the 24 facilities surveyed, 50 percent had at least one standard treatment manual and 50 percent had none at all. Table 13 breaks down the availability by facility type.

Table 13. Availability of Official Manual of Treatment Guidelines, by Facility Type

Facility Type	Number of Facilities Surveyed	Facilities with STG	% Facilities with STG
BAS	6	3	50
CLIN 1	6	4	67
CLIN 2	4	2	50
HOS 2	4	1	25
RMS	4	2	50

IMCI Guidelines

In Uganda a national IMCI manual (*IMCI Uganda: Management of Childhood Illness*, published by the MOH, WHO, and UNICEF in 1997) was adapted from the WHO IMCI guidelines. It is intended for use by physicians, nurses, and other health care personnel who treat children and who have received basic training in IMCI case management. Of the 24 health facilities visited, 83 percent had IMCI guidelines. None of the private pharmacies visited could produce the IMCI guidelines. Table 14 presents the availability by facility type.

The existence of a government-produced or -sanctioned manual or an STG manual is a measure of the official awareness for the need of information to promote rational use of drugs and effective care and treatment of children. Although the presence of an MOH manual or STG manual does not by itself ensure quality of care and rational prescribing, it does show that the

MOH has made a substantial effort to disseminate a reference source that supports appropriate case management and prescribing for treatment of children.

Training on rational drug prescribing and dispensing is now available at the University of Makerere. The Uganda branch of the International Network for Rational Use of Drugs (INRUD) has done substantial work in this area and has introduced training in rational prescribing and dispensing for nurses and other medical services in the districts.

Table 14. Availability of Official IMCI Manual, by Facility Type

Facility Type	Number of Facilities Surveyed	Facilities with Uganda IMCI Guidelines	% Facilities with IMCI Guidelines
BAS	6	3	100
CLIN 1	6	4	83
CLIN 2	4	2	100
HOS 2	4	1	100
RMS	4	2	50

Indicator 2. Percentage of encounters diagnosed as no-pneumonia (cough or cold) that are prescribed antibiotics

Indicator 3. Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines

These two indicators measure the degree of compliance to IMCI treatment guidelines for acute respiratory infections (ARI). They are listed here together because the two indicators represent the positive and negative outcome of the same area of prescribing practice—drug treatment for ARI.

No-pneumonia (cough or cold) represents more common self-limiting infections like the common cold, which is caused by a virus and thus should not be treated with antibiotics. Prescribing antibiotics for the common cold is a widely practiced inappropriate use of antibiotics. Using antibiotics when they are not needed is very costly, reduces availability for other more serious health problems, and contributes to antimicrobial resistance. The use of antibiotics to treat no-pneumonia also indicates nonadherence to IMCI guidelines. The Ugandan IMCI guidelines list cotrimoxazole and amoxicillin as appropriate antibiotics for the treatment of pneumonia.

Prescribing of Antibiotics

In government facilities, of the 2,784 patient records that were surveyed, 2,051 (73%) received at least one antibiotic.

Retrospective and Prospective Data Collection in Health Facilities

Of the 640 patient records of no-pneumonia that were reviewed, 91 percent were prescribed an antibiotic, which is a high prescribing rate. Of the 706 patient records of pneumonia, only 58 percent were prescribed an appropriate antibiotic. Table 15 provides the breakdown of antibiotic prescriptions by facility and condition.

Table 15. No-pneumonia and Pneumonia Cases Given Antibiotic, by Facility Type

Facility Type	No-pneumonia Patient Records		Pneumonia Patient Records	
	Total Cases	% No-pneumonia Cases Given an Antibiotic	Total Cases	% Pneumonia Cases Given an Appropriate Antibiotic
BAS	150	89	196	70
CLIN 1	192	88	196	49
CLIN 2	131	95	123	59
HOS 2	167	93	191	55

Simulated Purchases in Drug Retail Outlets

A total of 64 observations of patients were conducted in 20 retail facilities of which 29 (45%) encounters received at least one antibiotic. The no-pneumonia scenario with the simulated purchases was implemented in pharmacies near the health facilities. The scenario described a one-year-old child with a simple cold for the last two days. A total of 20 encounters of no-pneumonia simulations were conducted of which 11 (55%) resulted in an antibiotic prescription.

Antibiotics are costly therapies and are frequently overused. Antibiotic resistance to some common infections has rendered some formerly useful drugs ineffective. This state is partly due to uninformed, empirical use and prescribing practices and other forms of overuse. The findings from these indicators highlight the need for further training in prescribing for ARI and in compliance with recommended treatments in MOH facilities and drug retail outlets.

Indicator 4. Percentage of encounters diagnosed as diarrhea that are prescribed ORS

Indicator 5. Percentage of encounters diagnosed as diarrheals that are prescribed antidiarrheals

Indicator 6. Percentage of encounters diagnosed as non-dysentery/non-cholera diarrhea that are prescribed antibiotics

These indicators attempt to measure the degree of adherence to IMCI treatment guidelines for treating diarrhea. These indicators measure the percentage of diarrhea encounters that are prescribed ORS. Antibiotics and antidiarrheals are not recommended in IMCI guidelines for treating simple diarrhea. Dysentery and cholera encounters were excluded from the sample. In total, 686 encounters of simple diarrhea were reviewed.

Of the 686 encounters, 74 percent received ORS, three (0.43%) received an antidiarrheal, and 66 percent received an antibiotic (see Table 16). In spite of the good adherence to IMCI guidelines by giving ORS for simple diarrhea, the recorded rates of combining the treatment with an antibiotic prescription are clearly alarming, indicating improper treatment and inefficient use of scarce resources. These results are similar to surveys conducted in Zambia and Ecuador.

Table 16. Prescribing for Diarrhea Cases, by Facility and Treatment Type

Facility Type	Total Diarrhea Cases Diagnosed	% Diarrhea Cases That Received ORS	% Diarrhea Cases That Received an Antidiarrheal	% Diarrhea Cases That Received an Antibiotic
BAS	162	81	0	71
CLIN 1	202	81	0.43	64
CLIN 2	139	75	0	74
HOS 2	189	61	0	51

Simulated Purchases in Drug Retail Outlets

The diarrhea scenario with simulated purchases was implemented in drug retail outlets. The scenario describes a child of two years of age with numerous episodes of diarrhea in the last two days. Of the 20 simulated purchases conducted, four (20%) received ORS, six (30%) received antidiarrheals, and 17 (85%) received antibiotics. Drugs sold included antimicrobials such as cotrimoxazole, penicillins, and doxycycline. Antidiarrheals sold included loperamide and activated charcoal.

Overall, in drug retail outlets ORS dispensing is low and over-the-counter dispensing of antibiotics for children is high. Given that mothers often seek advice in drug outlets, the results suggest that educating them is necessary.

More than 70 percent of encounters in the public sector were prescribed ORS, but less than 20 percent of drug sellers recommended ORS, suggesting the need for building awareness of the value of ORS among drug sellers. In the public sector, however, ORS was often combined with antibiotics as shown in Table 16. These data indicate the lack of adherence to treatment guidelines and the need for further training in treatment guidelines and rational use of drugs. This

training should have a particular emphasis on the general use of antibiotics and the treatment of simple diarrhea in children.

Indicator 7. Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines

This indicator measures the degree of adherence with IMCI guidelines for the treatment of uncomplicated malaria. Given the endemic nature of malaria and widespread knowledge about the disease, the data collectors were expecting to see appropriate prescribing at all facilities. Of the 748 encounters reviewed, about three-fourths received an appropriate antimalarial. Table 17 shows the rates of appropriate malaria treatment at each type of facility.

Table 17. Appropriate Malaria Treatment, by Facility Type

Facility Type	Total Number of Cases	% Cases That Received an Appropriate Antimalarial
BAS	178	79
CLIN 1	224	83
CLIN 2	142	66
HOS 2	204	67

The results show that appropriate malaria prescribing occurred within a range of 66 to 83 percent of cases, showing some variation in adherence to IMCI malaria treatment guidelines. Proper treatment practices were best followed at health centers (79% and 83%). Clinics with a medical doctor showed a slightly lower adherence (66% and 67%).

Simulated Purchases in Drug Retail Outlets

As in the previous conditions, simulated purchases were implemented for malaria cases. The scenario described a two-year-old child diagnosed with malaria at an MOH health facility. Of 24 patients diagnosed with simple malaria in MOH facilities, 15 (63%) received an appropriate antimalarial in private drug outlets.

Indicator 8. Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed

One of the basic tenants for promoting the IMCI strategy is that the use of standardized treatment guidelines, if followed, will enforce the rational use of drugs. It also contributes to cost-effective and appropriate care that is likely to be cheaper than the cost of care if IMCI guidelines are not followed. This indicator measures the average cost of drugs currently prescribed for IMCI health conditions, and then compares that sum to what drug treatment would cost if IMCI treatment guidelines were followed. Treatment cost refers only to drug cost and not to labor or overhead costs. This indicator can also be used to demonstrate the average amount families spend on inappropriate treatment when purchased at retail outlets.

Drug prices for this study were based on MOH tender prices, the *International Drug Price Indicator Guide,* and the ideal price cost from the Uganda IMCI.

According to this indicator, current treatment practices at health facilities resulted in costs seven times (721%) higher than what costs would be if IMCI guidelines were followed. The data in Table 18 show the average cost of treatment at each health facility type.

Table 18. Percentage Increase in Cost of Treatment, by Facility Type

Facility Type	Current Cost of Treatment of the Five IMCI Conditions as a Percentage of the Cost If IMCI Treatment Guidelines Had Been Followed
BAS	671
CLIN 1	1,027
CLIN 2	301
HOS 2	734

The average cost of treatment per provider type was not calculated. However, the average costs of treatment tend to be higher in specialized institutions where physicians and clinical officers are present. These numbers clearly indicate that health problems that could be treated inexpensively are treated with expensive and perhaps inappropriate drugs, seen in the treatment of diarrhea or no-pneumonia ARI with antibiotics.

The average costs of treatment of three IMCI conditions were reviewed. The average drug treatment cost for pneumonia was three times (317%) greater than the drug treatment cost if following IMCI guidelines. For diarrhea this rate was 5 times (529%) higher and malaria it was approximately 19 times (1,894%) higher (see Table 19).

Table 19. Percentage Difference in Cost of Treatment, by Condition

Condition	Percentage Difference in Cost of Treatment Compared with IMCI Recommended Treatment Costs
Diarrhea	529%
Malaria	1,894%
No-Pneumonia	317%

Simulated Purchases in Drug Retail Outlets

The average cost of drugs dispensed at private retail outlets was calculated using the Uganda IMCI guidelines and the median retail unit price. Other prices were obtained by the MOH, simulated purchase data from retail drug outlets and wholesalers' price lists. The cost implications for two conditions were reviewed, as shown in Table 20.

Table 20. Percentage Increase in Cost of Treatment in Drug Retail Outlets

Conditions	% Increase in Cost of Treatment compared with IMCI recommended treatment costs
Diarrhea	1,611
Malaria	810

The diarrhea data are particularly high (16 times) because of the combined prescriptions of ORS and an antibiotic.

Findings from this indicator should help identify costs associated with current prescribing habits. They represent an area where costs may be reduced without sacrificing on quality of care and may increase drug availability and provide greater access to drugs for more patients.

Indicator 9. Percentage of prescribed drugs actually dispensed

This indicator measures the ability of health facilities to dispense the prescribed drug to caregivers. Of the 555 drugs prescribed during the survey, 477 (86%) were actually dispensed as prescribed, indicating generally good dispensing practices and drug availability, as shown in Table 21.

Table 21. Drug Dispensed As Prescribed, by Facility Type

Facility type	Drugs prescribed	% Drugs Dispensed Exactly As Prescribed
BAS	169	76
CLI 1	151	89
CLI 2	102	93
HOS2	133	90

However, further investigation revealed that, with few exceptions, health workers often prescribed drugs that they knew were available such as aspirin, paracetamol, or vitamins. As was observed in the drug availability indicator, individual drugs of a set of IMCI tracer drugs were out of stock 31.7 percent of the time during the previous 12 months. In the simulated private purchases, 119 drugs were prescribed, of which 117 or 98 percent were actually dispensed.

Indicator 10. Percentage of caregivers who could correctly describe how to give the prescribed medication

This indicator measures potential nonadherence to the prescribed regimen, which could lead to possible treatment failures due to the lack of knowledge among caregivers on how to correctly administer the medications. To describe correctly how to take the medication, the caregiver should know the dose to administer, how many times a day, and for how many days. All three of

these items should be mentioned verbally by the caregiver for the encounter to be considered correct.

Of the 202 caregivers who were interviewed at the exit of the health facilities, only 92 (46%) were able to describe correctly how the child should take the prescribed medication. The breakdown by facility type is presented in Table 22.

Table 22. Caregivers Who Could Correctly Describe How to Give Prescribed Medication, by Facility Type

Facility Type	Caregivers Surveyed at the Exit	% Caregivers Able to Correctly Describe How to Take Drug
BAS	61	52
CLI 1	49	45
CLI 2	43	23
HOS2	49	57

The findings demonstrate that in about half of the cases caregivers left the health facilities without understanding how to administer the drugs that were prescribed for their children. This finding suggests that the information that was supposed to be given to the caregivers by the health workers or drug dispensers was either inadequate or not communicated at all. The results of this indicator highlight the need for further training of the health workers in communication skills.

Indicator 11. Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem

The Uganda IMCI guidelines outline a series of screening questions concerning each child that promotes the evaluation, classification, and treatment of infants and children for the five IMCI health problems. Observing whether health workers ask clinical questions regarding the child's health problem will allow identification of areas where IMCI training should focus. This indicator will help to determine if IMCI guidelines are being followed and if general signs for referral to a hospital are well known to most of the health workers. It is worth mentioning here that all the health workers who were observed claimed that they have received either IMCI training or other training in child care. The types of questions to follow were customized from the IMCI guidelines and agreed upon with the data collectors and the DMCI coordinators during the training workshop.

Of the 189 health workers who were observed, 116 (61%) asked one or more clinical question to assess the severity of the health problem. The results showed that two-thirds of the health workers asked at least one question to determine the severity of the health problem and 39 percent did not ask the "IMCI" questions. National IMCI coordinators may decide whether health care providers in a particular area need refresher courses in case management of the sick

child on the basis of these results. The results of this indicator are presented by facility type in Table 23.

Table 23. Health Workers Who Asked One or More Questions to Determine Severity, by Facility Type

Facility Type	Health Workers Surveyed	% Health Workers Who Asked One or More Questions
BAS	54	72
CLI 1	51	63
CLI 2	39	77
HOS 2	45	33

These rates suggest that there is room for improving adherence to IMCI guidelines, especially in district hospital clinics with medical doctors.

This indicator was also applied in the simulated purchases in drug retail outlets. Of the 64 drug retail staff observed, only 10 (16%) asked one or more clinical questions to assess the severity of the health problem prior to dispensing medication.

Indicator 12. Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs

All the health workers who were interviewed said that it was part of their job to communicate and give information to the caretakers. Of the 189 health workers observed, 113 (60%) provided some information on how to take the prescribed medication. Table 24 lists the results by facility type.

Table 24. Health Workers Who Provided Information to Caregivers on How to Give Recommended Drugs, by Facility Type

Facility Type	Health Workers Surveyed	% Health Workers Who Provided Information on How to Take Medicine
BAS	54	65
CLIN 1	51	53
CLIN 2	39	62
HOS 2	45	60

The overall average is fairly low and corresponds to the low rates observed in DUS indicator 10, where only 44 percent of caregivers were able to correctly describe how to administer the medications. This indicator shows that, in general, health workers are not providing enough information to caregivers on how to administer the drugs.

A large proportion of drug consumption takes place in the private sector through drug sellers. Of the 64 pharmacy staff observed, 44 (69%) provided some information on how to take the prescribed medication. The results from the health workers and pharmacy staff underscore the need to address the information, education, and communication strategies by the IMCI coordinators.

Indicator 13. Percentage of health workers who told caregivers about any signs of progressive illness and recommended a doctor or clinic visit if the signs appear

This indicator focuses on whether the health worker is communicating to the caregiver any signs of progressive illness and is encouraging the caregiver to take the child for immediate or follow-up treatment. Out of 189 observations, about three-fourths of the health workers told the caretaker about signs of progressive illness. Table 25 shows the breakdown per facility type.

Table 25. Health Workers Who Told Caregivers about Signs of Progressive Illness, by Facility Type

Facility Type	Health Workers Surveyed	% Health Workers Who Told about Progressive Illness
BAS	54	57
CLIN 1	51	63
CLIN 2	39	77
HOS 2	45	58

In all but three of the 64 observations in drug retail outlets, caretakers were not informed about signs that might indicate worsening of the health condition.

The Use of Indicators

Standardized indicators to assess pharmaceutical sectors have been widely used for many years by MSH/RPM and other organizations such as WHO and PAHO. Indicator-based studies are cost-effective tools that measure, in a relatively short time, complex systems and give the investigators a snapshot picture of an overall trend in the sector. However, and in spite of their overall advantages, the DMCI indicators do not put these measurements in the social and economic context in which a local pharmaceutical system exists at the time of the study. Additional information about the sector is needed to determine which of the measures have the most weight to be regarded as good indicators for monitoring purposes.

All the above issues should be taken into consideration in interpreting the results of this assessment. Other sources of studies and data, specifically the role of the private sector, are needed to get a real grasp of the situation in the pharmaceutical sector. For statistical information on Uganda, see Annex 3.

National Drug Policy on IMCI Referral Drugs

The Uganda NDP is undergoing an update, the objective of which is to integrate national drug policy in support of the national health sector development. The MOH and the NDA within the framework of this policy brought together all IMCI interested parties to focus on the commitment to improve the pharmaceutical sector in general and to provide a framework for action to implement (within the law and overall national health policies) the strategic objectives of IMCI in securing essential drugs and, in particular, allowing the health centers to use prereferral drugs.

Pricing of Pharmaceuticals

The prices of pharmaceuticals at MOH facilities were obtained from local and international tender documents made available to the assessment team by the NMS, MOH, and wholesale and retail associations. The prices in the documents include the drugs that are in the kits. The prices of the DMCI tracer lists were compared with the median prices of MSH's *International Drug Price Indicator Guide*. Except for some drugs (see Table 4) the prices of drugs in Uganda were an average of the median price.

The findings show that the procurement processes, especially the tendering procedures to select the lowest and best prices for bulk procurement, are generally being followed. However, some prices rose sharply in some cases, particularly when health facilities made numerous small emergency purchases from local suppliers at noncompetitive prices to maintain a minimum supply of vital drugs and medical supplies.

Although the pricing policies in the private sector were not included in this study, expenditure reports of the simulated purchases confirmed that pricing control policies for pharmaceuticals and medical supplies in the private sector are not adhered to.

Issues Raised by the Data Collectors

The following list represents a summary of observations made by members of the four teams of data collectors:

- Incomplete records and data for drugs and medical supplies
- General poor management of inventory records, particularly those concerning local drug purchases
- Good inventory records on the use of vaccine supplies, which provide an example for institutions to follow
- Children's medical records not always available
- Different dosage forms and strengths than the ones indicated in the Uganda EDL and DMCI tracer list came from private donations and local purchases of brand names
- Different sources of supplies for the same drug
- Overworked and understaffed (particularly IMCI trained) personnel in most health centers
- No drug information systems at district level
- Study instruments do not cover quality of service of IMCI case management. (Authors' note: The important issue of IMCI quality of care and services was not the scope of the DMCI survey.)
- Suggest extend the training period of the data collectors
- Suggest including the data entry person in the training
- Suggest increasing by one week the data collection period

Conclusions

Uganda has made impressive progress in improving childhood health. In spite of the financial and human constraints at the MOH in implementing IMCI strategies, the MOH managed to show positive results in reducing the burden of infant disease. Uganda is also leading the way in health reforms and decentralized management of health services, and the achievements made so far in IMCI should be improved and expanded upon as the reforms take root at all levels of the health care system.

The study clearly indicates that drug management systems are weak, especially at the periphery, and that capacity needs to be strengthened in all areas of the supply chain management, such as inventory and stores management, quantification, rational drug use, consumption patterns, logistics management, consumer information, and information systems.

Although many drug prices were found to be below the average median international prices, these cost-savings gains are quickly eroded by the irrational prescribing habits and use of these drugs. Unless quick measures are taken to improve adherence to standard treatment guidelines and to change prescribing habits and the use of antibiotics, there is little doubt that some districts in Uganda could face a serious microbial resistance problem of the most common and inexpensive, but important, antibiotics.

The findings of this study clearly indicate that the management of public health supplies should be included in the IMCI curricula in order to maintain the gains that have been achieved so far by IMCI strategies.

Recommendations and Next Steps

The results presented in this report indicate specific problems in the availability and use of IMCI drugs in Uganda. The indicators in the DMCI should be viewed as the first step in a process of investigation of the problems that were discussed in the report. The findings can help MOH managers and district health managers to focus attention on the most acute problem areas of availability and use of IMCI drugs and medical supplies and discuss them with key stakeholders in drug supply management and IMCI implementation. The feedback of these meetings should be presented and shared with policy and decision makers.

For indicators such as the quality of the inventory system and irrational use of antibiotics in diarrhea, where the levels of performance were low, follow-up activities may be needed to determine the root causes of the problems identified.

Drug Policy Issues

1. Update the national drug policy through policy dialogue with IMCI stakeholders.

2. Incorporate the IMCI referral drugs, such as gentamicin and quinine injections, in the national formularies and stocks of the health centers. This change will surely reduce the risks and costs of over-referring patients to the hospital and will save children's lives.

3. Incorporate use of DMCI indicators in the district planning.

4. Ensure commitment by all stakeholders to national drug policies, and address IMCI drug issues such as coordination, implementation, and monitoring of availability and use at all levels of the health system.

Capacity Building in Managing Public Health Supplies

1. MOH may consider designing district-focused capacity building and training in drug management, the inventory control system, and rational use to improve availability and equity of access to and use of essential drugs. These approaches should include public and private sector collaboration particularly with the NGOs, community-based committees, and religious medical associations.

2. MOH should design and equip health workers and district health managers with simple tools (forms) to monitor critical IMCI supplies by introducing small-scale supply information and control systems, and MOH should devise communication systems between the district managers and the staff in the health centers.

3. Integrate drug management and rational drug use training into the IMCI training plan. The MOH office of the Principal Pharmacist should coordinate this training in collaboration with the NDA and University of Makerere (INRUD/Uganda). The training in managing drug supply should be targeted to the different categories of health workers at the health centers and include the community-based health workers.

4. MOH should include DMCI indicators in the monitoring and evaluation of the health system performance.

Case Management and Rational Drug Use

1. Update and disseminate the national STG and the Uganda IMCI treatment protocols. Harmonize the treatment interventions in the two documents.

2. Introduce easy-to-read drug management and rational drug use visual aids, flow charts, and posters in the health centers.

3. Reduce use of antibiotics and injections through consumer-targeted and community-based IEC campaigns. The authors also recommend working closely with community heads and community health committees to reduce the overuse of antibiotics and injections.

4. Establish district drug and therapeutic committees to monitor adherence to treatment protocols and costs of treatments at all levels. Promote the use of a simple costing tool at all levels.

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Annex 1: DMCI Indicators

Indicators

The assessment consisted of 7 drug availability indicators and 13 drug use indicators.

Drug Availability Indicators

Indicator 1: Percentage of DMCI tracer drug products on the National Drug Formulary (NDF)/Essential Drug List (EDL)

Indicator 2: Percentage of median international price paid for a set of DMCI tracer drugs that were part of the last regular MOH procurement

Indicator 3: Average percentage of a set of unexpired DMCI tracer drugs available in MOH storage and health facilities

Indicator 4: Average percentage of time out of stock for a set of DMCI tracer drugs in MOH storage and health facilities

Indicator 5: Average percentage of stock records that correspond with physical counts for a set of DMCI tracer drugs in MOH storage and health facilities

Indicator 6: Percentage of MOH storage and health facilities visited that have a working refrigerator with freezing compartment and thermometer for vaccine storage

Indicator 7: Percentage of MOH storage and health facilities with up-to-date refrigerator temperature monitoring records

Drug Use Indicators

Indicator 1: Percentage of MOH health facilities visited with an official manual of treatment guidelines for childhood illnesses, based on WHO IMCI treatment guidelines

Indicator 2: Percentage of encounters diagnosed as no-pneumonia (cough or cold) that are prescribed antibiotics

Indicator 3: Percentage of encounters diagnosed as pneumonia that are prescribed appropriate antibiotics according to treatment guidelines

Indicator 4: Percentage of encounters diagnosed as diarrhea that are prescribed ORS

Indicator 5: Percentage of encounters diagnosed as diarrhea that are prescribed antidiarrheals

Indicator 6: Percentage of encounters diagnosed as non-dysentery/non-cholera diarrhea that are prescribed antibiotics

Indicator 7: Percentage of encounters diagnosed as malaria that are prescribed an appropriate oral antimalarial, according to treatment guidelines

Indicator 8: Average cost of drugs prescribed as a percentage of costs if IMCI norms for treatment were followed

Indicator 9: Percentage of prescribed drugs actually dispensed

Indicator 10: Percentage of caregivers who could correctly describe how to give the prescribed medication

Indicator 11: Percentage of encounters where health workers asked one or more clinical questions from IMCI guidelines to determine severity of health problem

Indicator 12: Percentage of health workers who provided basic information to caregivers on how to give the recommended drugs

Indicator 13: Percentage of health workers who told caregivers about any signs of progressive illness and recommended a doctor or clinic visit if the signs appear

Annex 2: Collaborators

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Annex 3: Uganda Information Statistics

General and Health Statistics

Basic Indicators	*Total Population*	*Population under 5*	*Population under 18*	*Annual no. of births*	*GNP per Capita*
	20,554,000	4,215,000	11,668,000	1,054,000	US$ 330

Mortality	*Infant Mortality Rate (per 1,000 live births)*	*Under 5 Mortality Rate (per 1,000 live births)*	*Annual No. of Deaths of Children Under 5*
	84	134	141,000

Immunization % fully immunized (1-year-old children)	*BCG*	*DPT3*	*Polio3*	*Measles*	*TT2*
	69	46	47	30	38

Reproductive Health	*Total Fertility Rate*	*Contraceptive Prevalence*	*Maternal Mortality Ratio (per 100,000 live births)*
	7.1	15	510

Source: UNICEF Country Statistics, 1999

HIV/AIDS Statistics

Estimated Number of Adults and Children Living with HIV/AIDs, end of 1999			
Adults and children	820,000		
Adults (15–49)	770,000		
Women (15–49)	420,000		
Children (0–14)	53,000		
Estimated Number of Deaths from AIDS during 1999			
Adults and Children	110,000		
Estimated Number of Orphans* since the Beginning of the Epidemic			
Cumulative orphans	1,700,000		

Source: UNAIDS Epidemiological Fact Sheet, 2000 update

** Children under the age of 15 who have lost their mother or both parents to AIDS.*

Annex 4: Tracer Drugs and Supplies

Uganda IMCI Tracer List of Drugs, Vaccines, and Medical Supplies

IMCI Tracer List
Amoxycillin, 250mg/tab
Bacillus Calmette-Guerin vaccine, 10dose/amp
Benzyl Penicillin 1MU/vial
Chloramphenicol 100mg/amp
Chloroquine, 150mg/tab
Cotrimoxazole 120mg/tab
Cotrimoxazole 480mg/tab
DPT vaccine, 20dose/amp
Erythromycin, 250mg/tab
Ferrous Sulfate, 60mg/tab
Folic acid, 1mg/tab
Folic acid, 5mg/tab
Gentamicin, 40mg/ml
GV paint, 25 grams
Injection water, 10ml/ amp
Intravenous cannula pack/piece
Intravenous sets, pack
Measles vaccine, 20dose/amp
Mebendazole 100mg/tab
Nalidixic acid 500mg/tab
Nasal gastric tube, pack
Needles (21-23G), pack/piece
Oral rehydration salts
Paracetamol 500mg /tab
Polio vaccine
Quinine 300mg/ml
Rectal diazepam 5mg/sup
Ringer's lactate, 500ml
Sodium chloride 500ml
Sulphadoxine/pyrimethamine 525mg/tab
Tetracycline eye ointment 1%
Thermometer pack/piece
Vitamin A 100,000IU/tab
Vitamin A 200,000IU/tab