Zambia Assessment:
Drug Management for Childhood Illness

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Abbreviations and Acronyms

AIDS	acquired immunodeficiency syndrome
amp	ampoule
ARI	acute respiratory infection
BASICS	Basic Support for Institutionalizing Child Survival [Project]
CBOH	Central Board of Health
CMAZ	Churches Medical Association of Zambia
DAS	drug availability study
DGS	Dutch Royal Netherlands Aid Society
DMCI	drug management for childhood illness
DPT	diphtheria, pertussis, tetanus
DUS	Drug Use Study
EDL	Essential Drug List
EDMSS	Essential Drugs and Medical Supplies Stores
HIV	human immunodeficiency virus
IMCI	Integrated Management of Childhood Illness
MOH	Ministry of Health
MSH	Management Sciences for Health
MIP	median international price
NDF	National Drug Formulary
NDP	national drug policy
NGO	nongovernmental organization
NHSP	National Health Strategy Plan
OPV	oral polio vaccine
ORS	oral rehydration salts
PAHO	Pan American Health Organization
RPM	Rational Pharmaceutical Management [Project]
SIDA	Swedish International Development Agency
UNICEF	United Nations Children's Fund
USAID	U.S. Agency for International Development
UTH	University Teaching Hospital
WHO	World Health Organization
WHO/AFRO	WHO/Regional Office for Africa
ZNF	Zambian National Formulary
ZiHP	Zambia Integrated Health Project

Executive Summary

The report of the Zambia assessment of drug management for childhood illness summarizes the data obtained from the first African implementation of the *Drug Management for Childhood Illness (DMCI) Manual.* The purpose of the assessment was to review drug management for childhood illness in Zambia to identify strengths and weaknesses in the national drug management system.

The *DMCI Manual* was developed in response to the need for improving the drug management in the Integrated Management of Childhood Illness (IMCI) strategy. The Rational Pharmaceutical Management (RPM) Project collaborated to develop the DMCI with the U. S. Agency for International Development (USAID), Pan American Health Organization (PAHO), the Basic Support for Institutionalizing Child Survival (BASICS) Project, World Health Organization (WHO), and several experts from Zambia, Uganda, and Tanzania. The purpose of the *DMCI Manual* is to assist central and district level health managers in identifying issues in the public and private pharmaceutical sectors that are critical in ensuring the availability and use of drugs and essential supplies for IMCI.

The *DMCI Manual* examines two critical areas in drug management: availability and use. In Zambia the availability indicators were based on a list of 36 tracer drugs and supplies that were considered necessary for the treatment of the five IMCI conditions: acute respiratory infection (ARI), diarrhea, malaria, measles, and malnutrition. Availability data were collected through document review, structured interviews, and physical checks. The use indicators were based on three priority IMCI conditions: ARI, diarrhea, and malaria. ARI was divided into two conditions: pneumonia and no-pneumonia (cough and cold). Use data were collected from public health sector facilities through document review, interviews, drug inventory, a retrospective review of clinic records, and direct observation. Data were also collected from the private sector drug sellers through interviews and simulated purchases.

The assessment identified several problems associated with availability, particularly in procurement and inventory management.

- In 1998–99, the most recent time for which complete figures were available, the Ministry of Health (MOH) paid on average 129 percent of the average median international price for a set of IMCI tracer drugs. Of the 36 DMCI drugs and supplies listed, 14 (38%) were purchased above the median international procurement price. Clinical thermometers; diphtheria, pertussis, and tetanus (DPT) vaccine; nalidixic acid; and tetracycline ophthalmic ointment registered the highest acquisition prices.

- On average, 65 percent of the drugs in the tracer list were available in government facilities at the time of the study. The availability of the drugs was more of a problem for the health centers (60–67%) than the hospitals (72–83%). Chloramphenicol, cotrimoxazole, erythromycin, ferrous sulfate, nalidixic acid, oral rehydration salts (ORS), and paracetamol were the drugs most commonly out of stock. The tracer drugs were out of stock 28.3 percent of the time during the previous 12 months.

- In only 56 percent of records did the IMCI tracer list correspond with physical counts.

- On average the four main vaccines were available 86 percent of the time. Of the 20 facilities that were surveyed, 80 percent had at least one working refrigerator and 57 percent had up-to-date refrigerator temperature monitoring cards.

- Serious problems in drug use and prescribing practices were identified. Of the 20 public health facilities surveyed, only 45 percent had a clinical reference manual on treatments while about two-thirds had the IMCI guidelines.

- Most consultations in government facilities in Zambia result in a prescription. In general the data suggest overprescribing of antibiotics. Of the 2,433 patients records that were reviewed in government facilities, about 40 percent received at least one antibiotic.

Findings

The main findings include—

Public Health Facilities

- Too many no-pneumonia encounters (63%) were prescribed an antibiotic.

- Not enough pneumonia encounters (13%) were prescribed an appropriate antibiotic.

- Not enough simple diarrhea encounters (70%) received ORS. One percent received an antidiarrheal, and 14 percent received an antibiotic.

- Not enough simple malaria cases (49%) received an appropriate antimalarial.

- Not enough prescriptions (86%) were actually dispensed as prescribed.

- Not enough caregiver encounters (46%) were able to describe correctly how to take the prescribed medication.

Drug Retail Outlets

- Fifteen percent of encounters in retail facilities for no-pneumonia received at least one antibiotic.

- Too many no-pneumonia simulations (21%) received an antibiotic.

- Not enough simple diarrhea simulations (21%) received ORS.

- Sixty percent of simple diarrhea encounters were prescribed an antidiarrheal. Twenty-four percent of simple diarrhea encounters received an antibiotic.

- Not enough encounters (5%) received an appropriate antimalarial in private drug outlets.

- Not enough retail facilities (64%) asked one or more clinical questions from the Zambia IMCI guidelines to assess the severity of the health problem.

- Not enough of the drug retail staff (27%) asked one or more clinical questions to assess the severity of the health problem.

- Not enough of the pharmacy staff (41%) provided information on how to take the prescribed medication.

Comparative Review of Average Cost of Drugs per Treatment

The use of standard treatment guidelines should promote rational, cost-effective use of drugs. This assessment showed that the current cost of treatment of the five IMCI conditions was almost six times higher than if IMCI norms for treatment had been followed. The average drug treatment cost per treatment of ARI encounter was 4 times more than the drug treatment cost recommended by IMCI guidelines, 20 times more for diarrhea, 15 times more for malaria, and 3 times more for pneumonia. On average the cost of treatment was 24 times more expensive in simulated purchases in drug retail outlets than if IMCI treatment norms were followed.

Next Steps

Improving child health is a vital element of the health sector reforms. The Zambia national drug policy exists and has been integrated in support of the national health sector development. Within the framework of the national drug policy, the Central Board of Health (CBOH) should bring together all interested parties to focus on the commitment to improve the pharmaceutical sector in general and to provide a framework for action to implement the IMCI objectives in securing essential drugs for priority childhood illnesses.

Recommendations

Once the MOH/CBOH has evaluated these results and identified interventions, performance targets should be established and used to monitor progress. The following are the recommendations suggested in this report—

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

- Ensure the implementation of various cost-effective and efficient procurement practices with emphasis on priority childhood illness health problems.

- Train district staff on quantification methods, sustainable financing mechanisms, drug management, and budgeting.

- Customize monitoring tools for district level and health centers to monitor availability of essential drugs.

- Encourage public/private partnerships to be incorporated in the national health sector and together develop guidelines to improve availability.

- The CBOH should create a mechanism of information exchange on drug quality between the central level and the districts, and it should support the Pharmacy and Poison Board to develop informational campaigns to ensure quality, safety, and efficacy of all drugs used to treat children's illnesses.

- The CBOH should work to support and incorporate all training components for rational drug use, including clinical diagnosis and use of drugs by prescribers, dispensers, and consumers.

- All stakeholders—university teaching hospitals, regulatory bodies, schools, pharmacies, pharmaceutical wholesaler industries, health personnel, international agencies, and the media—in Zambia have a role to play to ensure that therapeutically sound and cost-effective drugs are used by the public at large.

- Harmonize standard treatment protocols for child health.

- Incorporate management training and rational use of drugs in the IMCI training component.

- Introduce district-based tools to improve drug management and inventory systems.

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.

A 1996 indicator-based study conducted in three Central Asia Republics by the Rational Pharmaceutical Management (RPM) Project showed that drugs and medical supplies essential to proper implementation of IMCI strategies were not readily available in government health facilities. The results of this study also showed the impact that drug unavailability and irrational use had on treatment costs.

With this 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 to help improve a country's IMCI drug management. DMCI is a comprehensive rapid assessment methodology with three components:

- *Drug Management for Childhood Illness Manual*
- Data Collector's Guide
- DMCI software program based on Epi-Info

Each DMCI study is based on 20 indicators that study drug availability and use. The *Manual* includes four supplemental indicators that are optional. Combined, the indicators determine 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 to facilitate entry and analysis of DMCI data.

RPM initially field tested the DMCI tool in Ecuador and Bolivia and it has since adapted a version to the African setting. In late 1999, RPM worked with local IMCI program managers, coordinated with the WHO/Regional Office for Africa (AFRO), and trained data collectors to apply DMCI in Zambia and Uganda. This report presents the results and background of the DMCI Zambia application. The assessment was conducted in Zambia in December 1999 and January 2000. The data were reviewed by the DMCI coordinator and were entered into the appropriate Epi-Info software.

The objectives of the Zambian DMCI assessment were as follows:

- Introduce and adapt the DMCI tool to the Zambian 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.

Zambian Health Situation

Zambia is a country of about 9.7 million people located in southern Africa. Children under the age of 15 make up 47 percent of the population, adolescents and youth 35 percent, and women of reproductive age 23 percent. The population is growing at 3.1 percent per year. Zambia is considered to be one of the most urbanized countries in the region, with approximately 40 percent of the population living in urban areas.

Health indicators in Zambia reflect a troubling situation. The prevalence of malaria remains high, with nearly half (48%) of children under five and 42 percent of adults being diagnosed with malaria. Maternal mortality is estimated at 649 per 100,000 live births. Most alarmingly, the human immunodeficiency virus/acquired immunodeficiency syndrome (HIV/AIDS) prevalence is 19.7 percent of the reproductive age group (15–49). The five major illnesses (ARI, diarrhea, malaria, measles, and malnutrition) continue to take their toll on children under five, as illustrated by a childhood mortality rate of 109 per 1,000 live births.

Table 1 shows the rates of some of the key health indicators in Zambia and sub-Saharan Africa. See Annex 4 for more Zambian statistics. In general, the Zambia health situation seems to be worse than the regional average.

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

Health Indicators*	Zambia	Sub-Saharan Africa
Life expectancy at birth	43 years	51 years
Infant mortality (per 1,000 live births)	109	104
Under-five mortality (per 1,000 live births)	197	169
Underweight prevalence	23.5%	30%
Maternal mortality (per 100,000 live births)	649	975
Total fertility rate (average no. of babies born to women in their reproductive years)	6.1	5.4% (avg.)**
HIV prevalence (15–49 years old)	19.7%	8.8%***
AIDS cases (per 100,000 population)	46.9%	11.2%

*Source: Zambia Demographic Health Survey, 1996.
**Source: "Total Fertility Rates in Sub-Saharan Africa, 1965–2000: Estimated Regional Aggregates." Center for International Health Information Health Statistics Database. September 1996. http://www.cihi.com/program%20Information/pop%Fam/affritfr.htm# (12/13/2000)
***Source: "Regional HIV/AIDS statistics and features, end of 2000." Page 5 in UNAIDS/WHO. December 2000. Joint United Nations Programme on HIV/AIDS (UNAIDS). UNAIDS/00.44E—WHO/CDS/CSR/EDC/2000.9. Geneva: WHO.

Zambian Drug Management System

Given the poor health situation in Zambia, in 1993 the Ministry of Health (MOH) began implementing a new, revised National Health Policy. The vision of the reform was "to ensure equity of access to cost-effective, quality health care as close to the family as possible." This policy emphasized decentralization measures and in 1995 the government passed legislation to establish District Health Boards. Under this legislation the MOH devolved many health sector responsibilities to the districts, including the management, quantification, and budgeting for medicines and drugs. Studies conducted in Zambia over the past few years have shown that drugs essential for providing primary health care and IMCI have not been readily available in government facilities. Despite decentralization of many drug management functions, the central government remains in charge of procurement activities. Nonetheless, drug and supply procurement is plagued by problems, leading to lengthy procurement processes, discontinuation of donor support, and ruptures in the distribution system.

The storage and distribution of government and donor-financed supplies is the responsibility of the Essential Drugs and Medical Supplies Store (EDMSS). Distribution is based on a preallocated and well-established distribution schedule of a "push" system that directs health kits to rural facilities. These kits are financed through donor support. The district facilities have "paper credit" accounts at the EDMSS, whereby each time the facility receives a kit or other supplies, the cost is deducted from the EDMSS account. Through this system, the facilities do not manage their own drug and supply funds—instead they are managed by the EDMSS. Facilities order non-kit commodities based on a "pull" system, by which they order drugs and supplies in bulk on a monthly basis. The districts are allowed to purchase drugs outside the national system when drugs are out of stock at the EDMSS or during an emergency, such as an epidemic outbreak, by using an emergency fund.

A number of problems have been observed in this system, some of them caused by lack of capacity at the district level, and others at the central level due to poor procurement planning, financial constraints, and chronic shortages of vital and essential drugs and supplies. The EDMSS suffers from lack of capacity to effectively manage a large logistics system, inefficient distribution, and weak information systems. In 1997, a logistics improvement plan was started and was supported by several donors, including the Swedish International Development Agency (SIDA), the Dutch Royal Netherlands Aid Agency (DGIS), and USAID. In October 1998, the Zambian MOH subcontracted the management of EDMSS to a private company with the hope that it would lead to improvements. Zambia spends just under US$1 per capita to purchase drugs for the public sector. The Zambian government's 2000 budget for drugs is 22.4 billion kwacha or US$8.3 million.

Applying the DMCI Tool in Zambia

In response to requests by USAID and BASICS, RPM presented a preliminary draft of the DMCI tool to the WHO at the IMCI Africa Regional (WHO/AFRO) meeting, in Harare, Zimbabwe, in June 1998. The participants expressed great interest in the approach. Therefore RPM continued refining the tool and in November 1999 conducted a workshop in Dar es Salaam, Tanzania, to present the latest version. The meeting included stakeholders from Tanzania, Uganda, and

Zambia and representatives of several bilateral and multilateral organizations, including the WHO headquarters and Africa regional offices, the World Bank, UNICEF, and a Tanzanian NGO (TEHIP). 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 DMCI assessment.

As a result of the Tanzania meeting, RPM and the Zambian Central Board of Health (CBOH) agreed to introduce the DMCI concept in the region and conduct the first assessment in Zambia. To facilitate and oversee the Zambian assessment, RPM hired a Zambian DMCI coordinator.

With the approval of the CBOH and the USAID/Zambia Mission, RPM and key Zambian stakeholders met in Lusaka prior to conducting the assessment. This step was critical to laying the groundwork for the DMCI assessment, as it helped build consensus around the concept of the tool, explain its usefulness in promoting IMCI strategies, review the DMCI indicators, assess their suitability to Zambia, and adapt them as required. This stakeholders' meeting was held in November 1999. The participants included the CBOH, the MOH Child and Health Unit, the University Teaching Hospital (UTH), the Malaria Center, nongovernmental organizations (NGOs), and other organizations supporting the management of childhood illnesses.

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 Zambia and its usefulness in supplementing a number of existing health sector assessment tools.

The participants recommended that the tool be adapted to the Zambian situation and that relevant adjustments be made during the training of the data collectors. Most of the suggestions focused on the data collection forms, such as making them easier for the data collectors to use, clarifying the questions, and adapting the questions to local phraseology. The discussions during the meeting highlighted the problems facing the national drug supply system and the inadequate supply of drugs. Recommendations from the meeting were to conduct a field test/assessment, review the results, and plan targeted interventions.

Study Design

The DMCI tool is designed to assess two drug management areas—availability and use—affecting the implementation of IMCI in four different settings—

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

In the DMCI tool, each of the two drug management areas is designed as a separate but complementary study, one on drug availability and one on drug use. As with the previous assessments conducted in Central Asia and South America, the Zambia DMCI study was designed to answer the following questions.

Drug Availability

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 and what is the performance of the system?

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

Drug Use

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 with what the estimated cost would be if IMCI treatment guidelines were followed?

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 retrospective component of the prescribing study looked at a facility's records on acute respiratory infections and diarrhea, while the prospective component covered all five IMCI conditions. The DUS targeted MOH facilities and drug retail outlets and used two methods of data collection: (1) retrospective—through records review and (2) prospective—through observation, interviews, and simulated purchases.

DMCI Indicators

Indicators are one option for monitoring the performance of a drug management system. Management Sciences for Health (MSH), in collaboration with WHO, PAHO, and other international organizations, has contributed to the development of a standard indicator-based approach to assessing pharmaceutical management systems. As described earlier, DMCI is an indicator-based tool to measure 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 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 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 were selected to review drug use practices for IMCI health problems and assess their appropriateness and cost implications. For the Zambia 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 Zambia DMCI assessment.

Table 2. Data Collection for Zambia 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 of Data Collectors

The participation of local officials in collecting data is crucial to conducting a DMCI assessment. Local participation is cost-effective, increases local capacity through training, and facilitates the finding and validation of data.

A local DMCI coordinator oversaw the entire DMCI assessment process (training, data collection, and data entry). The study required that at least 16 people be trained to collect data at the selected sites. The CBOH and MOH Child Health Unit in conjunction with the DMCI coordinator selected the data collectors, who were medical officers, pharmacists, pharmacy technicians, midwives, nurses, and clinical officers, from both public and private institutions. Some of the data collectors were trained in IMCI. See Annex 2 for a list of data collectors.

In a four-day workshop the DMCI coordinator, in collaboration with RPM and the CBOH, facilitated the training of the data collectors. The training focused on introducing the DMCI tool, explaining the purpose of the survey, and presenting data collection techniques. Questionnaires and data collection forms were reviewed in detail and revisions were made to localize the forms based on team consensus. The discussion on several indicators was very animated and provided a good overview of the Zambian health reform agenda.

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 the data collection process and for maintaining communication 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.

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

Site Selection and Sample Size

Zambia consists of nine provinces and 72 districts. Each province has one general or central hospital (see Annex 5). Many but not all districts have a district hospital. Facilities are owned either by the MOH, by the Churches Medical Association of Zambia (CMAZ), or by private industry (mostly mines). Table 3 shows the distribution of catchment population by type of facility. Representatives of the Zambian MOH provided the information in the table.

Table 3. Population Distribution among Facilities

Name	Type	Catchment Population	Area
Health Post	Rural	3,500	5 km radius
	Urban	7,000	
Health Center	Rural	10,000	29 km radius
	Urban	30,000–50,000	
First-Level Referral	Districts	80,000–200,000	
Second-Level Referral	General (provincial)	800,000	
Third-Level Referral	Central Hospital	> 800,000	

Table 4 lists the type and number of facilities in operation in each of the four provinces included in the study. This information is called the sampling frame, and the DMCI sample sites were chosen from the sampling frame.

Table 4. Sampling Frame for DMCI Zambia Study

Province (capital)	Population	Rural Health Centers	Urban Health Centers	District Hospitals	General Hospitals	Central Hospitals
Copperbelt (Kitwe)	1,916,870	34	77	4	0	2
Eastern (Katete)	1,376,972	126	1	3	1	0
Lusaka (Lusaka)	1,644,320	41	30	0	0	1
Northern (Samfya)	1,267,881	113	1	5	2	0

Source: *Health Planning Guide, 2000*, MOH/CBOH.

Health Facilities

Sampling followed the method described in the *DMCI Manual*. The process automatically included the capital city of Lusaka. The remaining three provinces were randomly selected from the eight other provinces. Five health facilities, one central and four periphery, were selected in each province. A provincial hospital, general hospital, or district hospital were included and four health centers were also selected in each province. Lusaka and Kitwe were chosen as urban districts while Katete and Samfya were chosen as rural districts.

The sites were chosen by the MOH/CBOH, RPM, and the DMCI coordinator. Attempts were made to include a variety of facilities according to geographic and socioeconomic variables, population density, geographic access, proximity to the district health office, passable roads, availability of trained health personnel, and other key features of the health system. Remote and hard-to-reach areas were excluded by the team from the selection process.

Lusaka and Kitwe are highly urbanized cities that operate large and autonomous hospitals. Unlike the district hospitals, the University Teaching Hospital (UTH), included in the study as a Lusaka hospital, procures and manages drugs almost independently. The district health facilities in Samfya, a rural district, are operated by the Christian Medical Association of Zambia.

Following the selection process, the CBOH contacted district health management offices to seek their approval to conduct the assessment. The DMCI coordinator was asked to provide health information on each of the districts, and to answer the request, data collectors gathered background information, location details, and kit inventory figures and calculated the number of personnel trained in IMCI at each facility.

The DMCI sampling guidelines were slightly modified. In some cases the drug availability sample was increased from 20 to 21 to include the district stores. For the drug use study, the sample size was 20 health facilities—five each in the four districts, including district hospitals. Table 5 lists the location, type, and characteristics of the sites included in the study.

Table 5. Site Selection and Sample Size

Facility type	Type of Health Workers	Lusaka	Kitwe	Katete	Samfya	Total
Central	Physician/Clinical Officer	2				2*
General Hospital	Physician/Clinical Officer		1			1
District / Mission Hospital	Physician/Nurse			1	1	2
Urban Health Centers	Physician/Clinical Officer/Nurse/Midwife	4	1			4
Rural Health Centers	Nurse/Midwife		3	4	4	12
Total		6	5	5	5	21

*Includes the Lusaka District Stores

Drug Retail Outlets

According to the Zambian Pharmaceutical Association, there are 60 private pharmacies and five drug manufacturers in Zambia. Almost 75 percent of the pharmaceutical market is in Lusaka, followed by Kitwe, Livingstone, and Ndola districts. Lusaka and Kitwe have large population densities with high purchasing power and higher access to pharmaceutical products.

The drug use component of the DMCI assessment includes a survey of prescribing and dispensing drug retail outlets. To choose drug retail outlets for the study, the DMCI team listed the drug retail outlets located near a health facility included in the DMCI study. The sample size for drug retail outlets was 20 sites per IMCI problem under study. The survey conducted three simulated studies. The location and number of drug retail outlets posed a significant problem in rural areas, and data collectors traveled considerable distances in Katete and Samfya to reach the number of pharmacies for this study.

Patient Encounter Samples

The assessment team reviewed 600 records per IMCI health problem studied 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, plus or minus 7.5 percent error.

- For statistical computation reasons, the sample size required for this assumption is 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

Prior to the assessment, RPM staff was informed that the Zambian standard treatment guidelines were under final review. However, according to a CBOH representative, most district facilities had a copy of the Zambian IMCI/WHO standard treatment guidelines. The assessment 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 around Zambia. The list was translated to local languages for use by the data collectors. The need for this step was discussed and proved to be a very important part of the training process.

Simulated Purchases

For the simulated purchases, trained data collectors visited pharmacy retail outlets posing as the caretaker of a child in need of treatment for no-pneumonia (cough and cold), malaria, or uncomplicated diarrhea. However, pharmacy owners and personnel in the rural areas know most of the residents in the area and would have been suspicious if the local languages were not used. Therefore, the data collectors were instructed to train one or two resident health workers and to limit their inquiries to a few preselected questions in the scenario text using the local languages.

Data Processing and Analysis

The questionnaires and forms for the drug availability and use studies were coded per geographic site and data collector teams and entered into Epi-Info software (version 6.0) by a local consultant trained by RPM staff. For quality purposes, the data were reentered into the software, and the reports that were generated were compared and analyzed by RPM staff in Arlington, Va.

This section of the report discusses the findings of the DMCI drug availability and use studies in Zambia.

Drug Availability Study

As mentioned earlier, the drug availability study comprises seven indicators. Each indicator is listed below, followed by findings.

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

The Zambian National Drug Policy was officially launched in February 1999 and is included in the National Health Strategy Plan (NHSP) 1998–2000. The Zambia Essential Drug List (EDL) and the Zambian National Formulary (ZNF) are integral elements of the policy and were first published in 1999. The Zambia National Formulary Committee compiled the first editions. 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 support for IMCI.

The DMCI tracer drug list was developed in collaboration with the MOH/CBOH. The tracer drug list is a compilation of the drugs included in the standard treatment guidelines for IMCI in Zambia. There were a total of 36 products on the Zambia DMCI tracer list (28 drugs, 4 vaccines, and 4 supply items). See Annex 3 for the complete list.

Except for the nalidixic acid tablet 250mg, all the tracer drugs were on the EDL and the ZNF. Nalidixic acid was the only drug that was not available in pediatric form. However, for indicator 1, the survey team agreed to use all dosage forms and strengths available to treat a child regardless of whether the "pediatric" strength or form was available. Using this interpretation of the indicator, all of the drugs on the Zambia DMCI tracer list are included in the EDL and ZNF.

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

The procurement system in Zambia is centralized. The MOH Procurement Unit has the official responsibility for procurement at the central level in the public health sector, including the management of donated drugs and kits for rural health centers.

This indicator is calculated by comparing the most recent MOH/CBOH acquisition price for a set of tracer drugs to the median international procurement price. The median international price (MIP) was obtained from the *International Drug Price Indicator Guide*.

In 1998–99, the most recent year for which figures were available, the MOH paid on average 129 percent of the median international procurement price for the set of IMCI tracer drugs. Of the 37 products listed, 14 (39%) were purchased above the median international procurement price.

The most costly items compared to the median international price for the following products:

- Clinical thermometers (371%)
- Diphtheria, pertussis, and tetanus (DPT) vaccine (537%)
- Nalidixic acid (470%)
- Tetracycline ophthalmic ointment (315%)

The remaining 23 products were purchased for less than the median international procurement price. The bulk purchasing schemes used by the MOH contribute to keeping prices down. Some of the products where inflated prices were recorded were purchased locally on a small scale. The 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. See Annex 6 for more data on price comparison.

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

This indicator measures the availability of the DMCI tracer list at the time of the study. In the best conditions, all drugs should be available at all times. Table 6 lists the percentage of stock available at each type of facility.

Table 6. Stock Availability

Facility Type	Average % of Tracer List Available
Clinic without medical doctor	60
Clinic with medical doctor	67
District hospital	83
Provincial hospital	72

According to the findings, district hospitals had the highest percentage of the listed products at the time of the study. The assessment found that on average about two-thirds of the drugs and supplies on the tracer list were available in government facilities at the time of the study.

Table 7 presents the average percentage of seven tracer drugs that were most often out of stock.

Table 7. Percent Availability of Seven Drugs (Most Often Out of Stock)

Stock Item	Average % of Certain Tracer Drugs Available
Chloramphenicol, 100mg/amp	50
Cotrimoxazole, 20/100mg/tab	50
Ferrous sulfate, 50mg/tab	41
Nalidixic acid, 250mg/tab	33
Paracetamol syrup	29
ORS	28
Erythromycin, 250mg/ml	23

As shown in Table 7, chloramphenicol, cotrimoxazole, erythromycin, ferrous sulfate, nalidixic acid, ORS, and paracetamol were the drugs most commonly out of stock. The availability of the drugs was more of a problem in health centers (60–67%) than in hospitals (72–83%). Hospitals likely have more options for filling stocks because of their budget procedures and geographical location in more urban areas. For example, central hospitals have drug budgets that they manage on their own and do not depend entirely on the EDMSS as the health centers do.

Regional patterns in drug availability were also noted. For example, Lusaka and Kitwe, two urban areas, had fewer problems finding the drugs they needed. The findings are consistent with data from other countries: rural health centers were several times more likely to experience stock-outs than urban centers were. Table 8 shows the percentage availability of children's vaccines at the time of the study.

Table 8. Average Percent Availability of Vaccines

Vaccine Type	Average % of Vaccines Available
Bacillus Calmette-Guerin (BCG)	89
DPT	83
Measles	89
Polio	83

The high vaccine availability rates are the result of a regular supply of vaccine donations and well-established and monitored distribution by the national Expanded Program of Immunization.

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. Together with indicator 3 this indicator allows for a more robust analysis of the stock situation over time and adds to the physical inventory conducted for 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 DMCI tracer drugs, the target time out of stock should be 0 percent, or no stock-outs.

In the surveyed MOH facilities, individual drugs of a set of IMCI tracer drugs were out of stock about one-fourth of the days during the previous 12 months. The overall range per type of drug was from 0 percent (all vaccines and IV sets) to 61 percent (paracetamol syrup). See Annex 7 for more details.

The findings help to understand if the availability of the various tracer list items is constant over time and if the system has the capacity to maintain constant supply. The stock-out ranges could be attributable to the sources of supply, such as whether the items are donated, as with vaccines, or centrally procured through the national system. As with indicator 3, stock-outs increase in the smaller, more peripheral health facilities. The facility-specific out-of-stock averages during 12 months are listed below in Table 9.

Table 9. Average Percent of Days Drugs Were Out of Stock, by Facility Type

Facility Type	Average Days Out of Stock
Clinic without medical doctor	26
Clinic with medical doctor	36
District hospital	8
Provincial hospital	19

These findings suggest that out-of-stock days vary widely in the surveyed facilities. However, district hospitals reported the lowest stock-out times of all 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

Government facilities use a variety of record-keeping tools, such as stock cards, logbooks, ledgers, tally cards, and improvised local forms. None of the health centers and only a few facilities in Lusaka had a computerized system of record keeping. For this indicator, the data collectors were instructed to talk with the store managers and give them some time to update their records prior to data collection.

This indicator is a cross-check to monitor the integrity of stock records. The average percentage of stock records that corresponds with physical counts is a measure of the quality of the stock record-keeping system. Low percentages of correspondence between stock records and physical counts may be the result of wastage or pilferage and may highlight problems of accountability, all of which contribute to financial losses. Table 10 lists the average percentage of records that correspond with physical counts.

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

Facility Type	Average % of Records That Correspond to Stock
Clinic without medical doctor	60
Clinic with medical doctor	65
District hospital	17
Provincial hospital	55

The percentage of records for the 37 DMCI tracer drugs, vaccines, and supplies corresponded exactly with physical counts somewhat over half of the time among all facilities combined. The range among individual facility types with records that correspond with the physical count was from 17 percent in district hospitals to 60 percent and 65 percent in rural and urban health centers. Further analysis would be required to determine the specific reason that the records in the district hospitals are least accurate.

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

All facilities should have a working refrigerator, which contributes to the ability to adequately maintain stocks of vaccines. For this indicator, the data collectors physically inspected the appliance to see if the following conditions for a working refrigerator 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 was not met then the health facility was considered not to have a working refrigerator. Although important for vaccine initiatives, the data collectors were not asked to check if the facilities had cold boxes or ice packs because it was outside of 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
Clinic without medical doctor	13	69
Clinic with medical doctor	2	100
District hospital	2	100
Provincial hospital	3	100

Of the 20 facilities that were surveyed, 80 percent had at least one working refrigerator.

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

This indicator is used to determine how well the facilities monitor the equipment that keeps the vaccines cold. Vaccines that are stored at improper temperatures at any point in the transport to the health facilities or in the facilities themselves may be damaged to the point of losing efficacy. To ensure that vaccines are not compromised, it is important to establish a system to monitor their storage temperature. Such a system would permit identification of any breakdown in the system and enable repair before damage occurs to the vaccines.

Of the 20 facilities surveyed, 55 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
Clinic without medical doctor	13	69
Clinic with medical doctor	2	100
District hospital	2	50
Provincial hospital	3	0

These findings, combined with those of indicator 6, suggest that although district and provincial hospitals had working refrigerators at the time of the study, they were not monitoring the refrigerator temperatures. A break in recording suggests that the facility does not have an up-to-date monitoring chart and does not follow WHO recommendations to monitor vaccine storage temperature at least twice a day.

Drug Use Study

Thirteen indicators were used to assess drug use. Each indicator is listed below, followed by a review of the data and findings.

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

This indicator is used to measure the level of access to information to promote effective care and management of sick children through the use of standard treatment guidelines.

Standard Treatment Guidelines

Most health workers told the data collectors that they had at least one clinical reference copy. The most common reference was the MOH's *Integrated Treatment Guidelines for Frontline Workers*, 1997–98 edition. In some cases the health workers reported that the manual was either locked away or was left at home. The data collectors were asked to count the manuals that were physically present and readily available at the time of the survey. Of the 20 facilities surveyed, only 9 percent had a standard treatment manual (see Table 13).

Table 13. Availability of Official Manual or Clinical Treatment Reference

Facility Type	Number of Facilities Surveyed	% with Standard Treatment Manual
Clinic without medical doctor	13	62
Clinic with medical doctor	2	0
District hospital	2	0
Provincial hospital	3	33

IMCI Guidelines

The MOH of Zambia, with technical assistance from BASICS, adapted the Zambia IMCI clinical algorithms from the IMCI training materials that were developed by WHO, UNICEF, and other collaborators. The guidelines are intended for use by physicians, nurses, and other health care personnel who have received training in IMCI case management. Of 21[1] facilities surveyed, about two-thirds (66%) had IMCI guidelines.

[1] One district medical store was included in the survey.

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

Facility Type	Number of Facilities Surveyed	% with IMCI Guidelines
Clinic without medical doctor	14	71
Clinic with medical doctor	2	100
District hospital	2	0
Provincial hospital	3	67

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 attempt to measure the degree of adherence 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.

For the purpose of the study ARI was divided into *pneumonia* and *no-pneumonia (cough or cold)*. No-pneumonia (cough or cold) represents more common self-limiting infections like the common cold, which are caused by viruses 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 antibiotic resistance. The use of antibiotics to treat no-pneumonia also indicates nonadherence to IMCI guidelines.

In developing countries, bacteria cause most cases of pneumonia. These cases need treatment with antibiotics, as stipulated by IMCI guidelines. However, antibiotics are costly therapies and are frequently overused, resulting in waste of money and drugs. Furthermore, antibiotic resistance to common infections has rendered some formerly useful drugs ineffective. Indiscriminate, empirical, and uninformed prescribing practices are partly to blame for this situation. When national capacity for laboratory monitoring of antimicrobial sensitivity is limited or nonexistent, as is the case in Zambia, the problem is especially serious.

Prescribing of Antibiotics

Most encounters in government health facilities in Zambia result in a prescription of some type. In government facilities, 2,433 patient records were reviewed in this assessment, and about 40 percent were prescribed at least one antibiotic.

Retrospective and Prospective Data Collection in Health Facilities

The data collectors reviewed 652 encounters of no-pneumonia (cough and cold), of which about two-thirds (63%) were prescribed an antibiotic—a very high prescribing rate. Data were also collected on 489 encounters of pneumonia, of which only 13 percent were prescribed an appropriate antibiotic. Table 15 provides the breakdown of antibiotics prescriptions for the two kinds of ARI.

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

Facility Type	% of No-Pneumonia Encounters Prescribed an Antibiotic	% of Pneumonia Encounters Prescribed an Antibiotic
Clinic without medical doctor	60	13
Clinic with medical doctor	76	19
District hospital	51	8
Provincial hospital	73	9

Several data collectors made the important observation that while many children who did not need antibiotics were prescribed them, many of the children who really did need (at least one dose of antibiotics) before referral did not get them. As reported earlier, at the time of the study Zambia had widespread shortages of drugs, especially in the district and urban health centers.

These indicators highlight the need for further training in prescribing for ARI at all levels. Another important point is that health workers in rural areas do not receive referral antibiotics (e.g., cotrimoxazole tablets) in the drug kits to treat children unless they have previously received training approved by IMCI case management.

Simulated Purchases for No-Pneumonia in Drug Retail Outlets

A total of 71 simulated purchases covering both malaria and no-pneumonia took place in 20 retail facilities. About 15 percent of encounters resulted in purchase of at least one antibiotic.

More specifically, a total of 24 encounters of no-pneumonia simulations were conducted in the four districts. Five (21%) of the no-pneumonia simulations resulted in an antibiotic prescription.

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

This indicator attempts to measure the degree of adherence and nonadherence to IMCI treatment guidelines for treating uncomplicated diarrhea. Complicated diarrhea, dysentery, and cholera were excluded from the sample. This indicator measures the percentage of diarrhea encounters that are prescribed ORS, antidiarrheals, or antibiotics. Antibiotics and antidiarrheals are not recommended for treating simple diarrhea in children.

Data on a total of 597 encounters of diarrhea were reviewed and showed relatively good prescribing practices and adherence to IMCI guidelines. About 70 percent received ORS. Only 1 percent were prescribed an antidiarrheal and 14 percent of the encounters resulted in an antibiotic prescription. Table 16 represents the data collected for this indicator.

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

Facility Type	Total Diarrhea Encounters	% of Diarrhea Cases Prescribed ORS	% of Diarrhea Cases Prescribed an Antidiarrheal	% of Diarrhea Cases Prescribed an Antibiotic
Clinic without medical doctor	414	311	1	14
Clinic with medical doctor	64	36	0	20
District hospital	30	27	0	3
Provincial hospital	89	43	0	16
Total	597	70	1	14

Simulated Purchases for Simple Diarrhea in Drug Retail Outlets

The diarrhea scenario from 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. A total of 26 simulated purchases were conducted. ORS was prescribed for treatment of simple diarrhea in about one-fifth of the encounters. Antidiarrheals were prescribed in 57 percent of the encounters and antibiotics were prescribed in 23 percent of the encounters. Drugs that were sold (recommended) by the drug retail outlet personnel included cotrimoxazole, penicillin, doxycycline, loperamide, and activated charcoal. Table 17 lists the types of treatments sold during the simulated purchases.

Table 17. Diarrhea Treatments Sold during Simulated Purchases

Facility Type	Total Diarrhea Cases Diagnosed	% of Diarrhea Cases That Received ORS	% of Diarrhea Cases That Received an Antidiarrheal	% of Diarrhea Cases That Received an Antibiotic
Private drug retail outlet	26	19	57	23

The difference in results in the public sector, which generally followed IMCI guidelines in prescriptions of ORS, and results in the private sector (drug outlets) suggests the need for building awareness of the value of ORS among drug sellers. Because mothers often visit drug retail outlets seeking advice, drug outlet staff should be better educated in prescribing appropriate treatment of simple diarrhea.

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 to 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 high levels of appropriate prescribing in all the facilities. Unfortunately, of the 693 encounters reviewed with simple malaria, scarcely half received an appropriate antimalarial. Fifty-one percent of the children diagnosed with malaria went untreated or received inappropriate treatment. Table 18 shows the number of appropriate malaria treatment at each facility as a proportion of encounters reviewed.

Table 18. Appropriate Malaria Treatment, by Facility Type

Facility Type	Total Number of Malaria Encounters	% of Cases That Received an Appropriate Antimalarial
Clinic without medical doctor	489	56
Clinic with medical doctor	67	10
District hospital	32	91
Provincial hospital	105	29

The results show that appropriate malaria prescribing occurred in 10 to 91 percent of cases, showing wide variation in adherence to IMCI malaria treatment guidelines. Proper treatment practices were best followed at district hospitals (91%). Urban health centers with a medical doctor showed lower adherence (10%) to IMCI standards. The reasons that doctors and provincial hospitals exhibited such low adherence rates to malaria treatment would require further analysis. The most common problem was that doctors claimed that they looked for complicated problems and let the caretakers buy the antimalarials in the private sector.

Simulated Purchases for Malaria in Drug Retail Outlets

As in the previous cases of simulated purchases, the data collectors made simulated purchases for malaria cases. The scenario described a two-year-old child with fever. Of the 22 simple malaria simulations, only one simulation 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 tenets for promoting the IMCI strategy is that the use of standard treatment guidelines, if followed, will promote 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. On the basis of these assumptions and using the recommended IMCI treatments in Zambia, this indicator measures the average cost of drugs currently prescribed for an IMCI health condition, 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 that families spend on inappropriate treatment when purchased at retail outlets.

Drug prices for this study were based on the latest MOH tender prices, the *International Drug Price Indicator Guide,* and the ideal price cost from the Zambia IMCI algorithm. It is important to note that the average cost of treatment for simple diarrhea was high because at the time of the study ORS was not available in MOH facilities. The local cost of one pack of ORS in the private sector was on average four to six times the international price.

The current treatment practices at health facilities resulted in costs about 6 times higher than what costs would be if IMCI guidelines were followed. The data in Table 19 show the average cost of treatment at each health facility type.

Table 19. 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 Following IMCI Treatment Guidelines
Clinic without medical doctor	685 (7 times)
Clinic with medical doctor	559 (5 times)
District hospital	732 (7 times)
Provincial hospital	427 (4 times)
Average of all facilities	**2,403 (6 times)**

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. Costs were high whether or not a doctor was present at the facility. However, they tend to be as high if not higher at clinics without a medical doctor, where the poorest are most likely to go. These numbers clearly indicate a trend in which health problems that could be treated inexpensively are treated with expensive and perhaps inappropriate drugs, for example, when cases of diarrhea or no-pneumonia are prescribed expensive antibiotics. Prescribing and procurement practices will need to be addressed to find a solution to these trends.

The average costs of treatment by condition were also reviewed. The average drug treatment cost per ARI encounter was four times greater than the drug treatment cost if following IMCI guidelines. For diarrhea this rate was 233 times higher, for malaria it was 15 times higher, and for pneumonia it was almost three times higher.

Table 20. Percentage Increase in Cost of Treatment, by Condition at Health Facilities

Condition	Percentage Increase in Cost of Treatment Compared with IMCI Recommended Costs
ARI	418 (4 times)
Diarrhea	2,333 (23 times)
Malaria	1,567 (15 times)
Pneumonia	284 (3 times)

As noted earlier, the cost of treatment of simple diarrhea is high because of the costs of the antibiotics that were prescribed with the ORS.

Cost of Simulated Purchases in Drug Retail Outlets

The cost of drugs in drug retail outlets if the IMCI guidelines had been followed was calculated using the Zambia IMCI guidelines and the median retail unit price in Zambia. Other prices were obtained by the MOH, simulated purchase data from retail drug outlets, and wholesaler price lists. The prices included the markups. The breakdown of the cost implications for each illness in the private sector was reviewed. On average the cost of treatment was 3 times more expensive, as shown in Table 21.

Table 21. Percentage Increase in Cost of Treatment in Drug Retail Outlets

Private Facilities	Percentage Increase in Cost of Treatment Compared with IMCI Recommended Costs
ARI	100 (1 time)
Diarrhea	678 (6 times)
Malaria	202 (2 times)
Average	**980 (3 times)**

Indicator 9. Percentage of prescribed drugs actually dispensed

This indicator measures the ability of health facilities to dispense the right drug to caregivers. Of the 154 drugs prescribed during the survey, about 86 percent were actually dispensed as prescribed, indicating generally good dispensing practices and drug availability, as shown in Table 22.

Table 22. Drugs Dispensed as Prescribed, by Facility Type

Facility Type	Drugs Prescribed	% of Drugs Dispensed Exactly As Prescribed
Clinic without medical doctor	115	87
Clinic with medical doctor	15	80
District hospital	4	100
Provincial hospital	20	85

However, this figure seemed high given the shortages of drugs that the country was experiencing at the time of the study. Further investigation revealed that health workers often prescribed drugs they knew were available such as aspirin, paracetamol, or vitamins. As was observed in indicator 4, individual drugs of a set of IMCI tracer drugs were out of stock 28 percent of the time during the previous 12 months. At the time of the study the availability of key drugs recommended as first-line drugs in the treatment of diarrhea and ARI (such as cotrimoxazole, ampicillin, and amoxycillin) was low in all the district hospitals because of procurement delays.

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

This indicator measures potential for nonadherence and possible treatment failure due to the lack of knowledge among caregivers on how to administer medication correctly. To correctly describe 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 to the data collector for the encounter to be considered correct.

Of 150 caregivers who were surveyed at the exit of the health facilities, less than half (46%) were able to describe correctly how to take the prescribed medication. The breakdown by facility type is presented in Table 23.

Table 23. Caregivers Who Could Correctly Describe How to Give Prescribed Medication

Facility Type	No. of Caregivers Surveyed	% of Caregivers Able to Correctly Describe How to Take Drug
Clinic without medical doctor	107	50
Clinic with medical doctor	18	44
District hospital	5	80
Provincial hospital	20	15

The findings suggest that the information the health workers or drug dispensers provided to the caregivers was inadequate. The majority of interviewed caregivers told the data collectors that the health workers did not take the time to explain how to take the medication, and that, in general, communication between caregivers and health workers was inadequate. These findings underscore the need to address the issue of communication skills during the IMCI training courses.

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

IMCI requires that health workers assess and manage every sick child coming to the health facility in a comprehensive manner. The 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 the identification of areas where IMCI training should focus. This indicator helps to determine if IMCI guidelines are being followed and if general signs for referral to a hospital are known to the health workers.

In a survey of 20 health facilities, a total of 151 observations of health workers were conducted. In almost two-thirds (64%) of the observations, health workers asked one or more clinical questions from the Zambia IMCI guidelines to asses the severity of the health problem. The results are presented by facility type in Table 24.

Table 24. Health Workers Who Asked One or More Questions to Determine Severity, by Facility Type

Facility Type	Health Workers Surveyed	% of Health Workers Who Asked One or More Questions
Clinic without medical doctor	110	71
Clinic with medical doctor	16	19
District hospital	5	100
Provincial hospital	20	55

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

Simulated Purchases in Drug Retail Outlets

In drug retail outlets, the staff usually did not ask one or more clinical questions to assess the severity of the health problem. In 27 percent of the 74 observations, caretakers were not informed about signs that might indicate worsening of the health condition.

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

This indicator measures whether health workers are able to communicate to patients how to take their medication. This component is important in gaining an understanding of patient use of medication and patient education and in pinpointing communication problems between the health worker and the caregiver. All health workers interviewed mentioned that it was part of their job to communicate with the caretakers.

In a survey of 20 health facilities, a total of 152 observations of health workers were conducted. Only 59 percent of the health workers provided information on how to take the prescribed medication. Table 25 lists the results by facility type.

Table 25. Health Workers Who Provided Information to Caregivers on How to Give Recommended Drugs

Facility Type	Health Workers Surveyed	% of Health Workers Who Provided Information on How to Take Medicine
Clinic without medical doctor	112	68
Clinic with medical doctor	16	44
District hospital	4	0
Provincial hospital	20	30

The overall average is fairly low and corresponds with the rates observed in indicator 10, where only 46 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.

Simulated Purchases in Retail Drug Outlets

When this indicator was applied in simulated purchases at drug retail outlets, 41 percent of the 73 pharmacy staff observed provided information on how to take the prescribed medication. This low rate suggests that at both drug retail outlets and health facilities, training could help improve communication and support patient adherence to treatment.

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

The IMCI guidelines recommend that all patients be evaluated, diagnosed, treated, and given follow-up. This process allows for detection of both acute and chronic conditions. The ability of health workers to ensure follow-up care and parent education is an essential component of the IMCI process. Therefore, this indicator focuses on whether the health worker is communicating to the caregiver signs of progressive illness and encouraging follow-up treatment. Rapid

identification of acute cases of illness may improve the health facility's ability to treat children adequately and reduce child mortality.

Of 151 health workers observed, only about one-half (55%) told the caretaker about signs of progressive illness. Table 26 shows the breakdown by facility type.

Table 26. Health Workers Who Told Caregivers about Signs of Progressive Illness, by Facility Type

Facility Type	Health Workers Surveyed	% of Health Workers Who Told about Progressive Illness
Clinic without medical doctor	110	57
Clinic with medical doctor	16	31
District hospital	5	100
Provincial hospital	20	50

As described in indicator 11, 64 percent of health workers asked at least one clinical question. In contrast only half of the health workers told the caretakers of signs of progressive illness. The results from these two indicators show that the health workers did not communicate well with the caretakers or did not refer children to hospitals. When asked by the data collectors why some children were not referred, the health workers said that they knew that the financial constraints of the caretakers and the distances of referral facilities would deter caregivers from pursuing follow-up treatment.

Simulated Purchases in Retail Drug Outlets

In drug retail outlets, the results were even more dramatic with only one of 73 pharmacy staff telling the caretaker about signs of progressive illness and referring them to a clinic or specialist.

The Use of Indicators

The use of standardized indicators to assess pharmaceutical sectors has 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 complex systems in a relatively short time and give the investigators a snapshot picture of the sector. Because these studies need informed inside knowledge, they require the full participation and collaboration of local staff. In doing so, indicator-based studies build local capacity and disseminate new concepts to all staffing levels. However, and in spite of their overall advantages, indicators alone do not put these measurements in a socioeconomic context, such as the one that Zambia was in at the time of the study.

At the time of this study, the shortages of medical supplies and drugs were attributed to a lack of financial resources and the problems MOH and CBOH staff were having in managing pharmaceutical procurements. While these problems did exist, they do not describe the problems that the cooperating partners supporting the pharmaceutical sector were having with the CBOH. The working relationship had been strained for almost a year and was just moving after a long standstill on many issues including supply of drugs. The disruption of donor-supported (including World Bank loan) supplies during this period has contributed to a general morale letdown of many health workers and has affected quality of health services in general and drug management in particular. Given the relatively long lead-time in procurement in Zambia, the much-needed drugs and supplies were not expected to be in the country soon enough to alleviate the shortages. Therefore, the interpretation of the DMCI study on drug availability should be taken in the context of the broader problem facing the national drug management system. Fortunately, the supply of rural health kits and of certain bulk drugs and medical supplies were processed and delivered to the districts.

The indicators alone also do not capture the economic and health crisis that Zambia was facing during this period. The economy was suffering from a crisis in the copper market—the main foreign exchange earner—and the government was losing millions of dollars because negotiations on the sale of the copper mines to a foreign consortium were slow. In health, the human and financial toll of the HIV/AIDS pandemic, malaria, and tuberculosis is well documented in other reports.

All of those issues should be taken into consideration in interpreting the results of this assessment. Other sources of studies and data (e.g., role of the private sector) are needed to get a real feel of the situation in the pharmaceutical sector.

National Drug Policy on IMCI Referral Drugs

In Africa, the majority of children under five years of age seeking referral treatment are in a rural setting. This complicates the work of many IMCI-trained health providers because national drug policies do not include clear guidelines on how to handle the distribution and use of IMCI prereferral drugs.

In Zambia, the NDP clearly states that only trained staff can handle certain categories of drugs. The Zambian EDL is divided by therapeutic categories, level of use by health providers, and institutions.

Several years ago, a verbal agreement was reached between the CBOH and the district management boards to distribute referral drugs (normally used in district hospitals) to rural health centers where trained IMCI staff are in post. In practice, however, this agreement is not working very well, because of the logistics problem that it represents for the medical stores and because the district hospitals are often in short supply of the same drugs. Although the quantities needed at health center level are small, some districts boards claimed that they could not buy or fund them for the districts. This problem seems not to affect health centers that are run by religious missions. It is important to note at this point that not all the 72 districts in Zambia are implementing IMCI.

It is in this context of uncertainties about the drug policies that the DMCI study was conducted. The National Drug Authority (Pharmacy and Poisons Board), MOH, CBOH Department of Child Health, and other organizations implementing IMCI at central and district level need to get together and agree on how to proceed on the issue of IMCI referral drugs in the rural health kits. The balancing act between the laws and the ethical obligations to save children's lives needs to be resolved as soon as possible through national consensus.

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 CBOH. The prices in the documents include drugs that are in the kits. The prices of the DMCI tracer lists were compared with the median prices in the *International Drug Price Indicator Guide* (see Annex 6). On average the prices paid by MOH were 30 percent higher than the international median price.

Of the 32 drugs in the list, the prices of 21 items (64%) were purchased at a price within the range of or cheaper than the international median prices. Eleven drugs (33%) were purchased at higher prices with DPT vaccine (537%), gentamicin 10mg/ml injection (553%), nalidixic acid 250mg tablet (470%), and tetracycline ointment (315%) purchased at high prices. Of the four medical supplies, only the I.V. set was purchased at a cheaper price while clinical thermometers (372%), nasogastric tubes (159%), and syringes were purchased at extremely high prices. It is important to note that most children's vaccines are donated and are purchased only in rare cases.

The findings imply that there are serious flaws in the procurement process. The MOH (and some districts) made numerous small emergency purchases from local suppliers at noncompetitive prices to maintain a minimum supply of vital drugs and medical supplies. These findings are in line with reports from other countries with similar supply problems. Furthermore, the study found that pricing control policies for pharmaceuticals and medical supplies in the private sector are not adhered to.

Issues Raised by the Data Collectors

The bullets below represent a summarized list of observations made by members of the four teams of data collectors:

- Records and data for drugs, vaccines, and medical supplies are incomplete.
- General poor management of inventory records, particularly those concerning local drug purchases, was seen.
- Poor inventory records existed on the use of vaccine supplies.
- Children's medical records are not kept at institutions.
- Different dosage forms and strengths than the ones indicated in the EDL and study instrument (private donations or local purchases) were seen.
- Different sources of supplies were seen among some facilities, particularly the mission institutions.
- Understaffing of IMCI-trained personnel in most health centers was noted.
- Drug and health management information systems were poor.
- Study instruments do not cover detailed IMCI case management (quality of services). For instance, the prescriber does not ask the caretaker whether the child has taken any other drugs before seeking consultation. (Author's note: The important issue of quality of services is not the scope of the DMCI survey.)

Drug Policy Issues

The main objective of the DMCI assessment in Zambia was to review the weaknesses and strengths in managing public health supplies that support the implementation of the IMCI strategies. The indicators in the DMCI manual represent general measure of the system and provide a useful summary of the drug management system. The results can help MOH and CBOH managers to suggest potential causes and solutions. The following is a summary of issues that were highlighted from the findings.

Availability and Accessibility

At the time of the study, the availability of public health supplies was low and was affecting central, provincial, and district hospitals and the urban health centers. Most of the facilities replenish their stocks of drugs and medical supplies from the national store, the EDMSS, and at times from wholesalers in the private sector. When shortages occur, the health facilities can do two things: (1) contact the MOH to purchase urgently needed supplies on their behalf or (2) use a small percentage of their own budgets that are allowed to be spent on emergencies. In real life, however, this system does not function well because of the following reasons. First, the district drug budgets are tied (on paper) to an account at EDMSS, which precludes them from using their budget independently to buy drugs from other sources in case of acute shortages, particularly lifesaving drugs. Second, when health facilities are allowed to buy in the private sector, they are allowed to use their own budgets under an emergency fund, which diverts funds from other emergency activities in the district. This type of procurement method is also not the most appropriate way to buy cheap essential drugs. The third reason is that the financial resources available to the MOH to cover emergency purchases for all institutions are usually low and are often reserved to cover basic supply needs for the central and provincial institutions.

On the other hand, the rural health centers receive the rural kit on a monthly basis. These drug kits are donated by the Dutch Royal Netherlands Aid Society (DGIS). At the time of the study the rural health centers were short of drugs for several weeks because of delays in delivery from the supplier. Anecdotal reports from the data collectors also suggest that in times of acute shortages, some district hospitals open the kits and use some items, particularly the antibiotics, which meant that the kits were sent out in incomplete form.

Zambia, like other countries in the region, has a National Drug Policy and a drug management action plan that are closely linked to the concepts of the Essential Drugs Program and the National Health Plan. These policies have been critical to improving access to affordable, appropriate, good-quality drugs and medical supplies. However, much remains to be done at the policy level to improve availability and access of essential drugs, particularly in the areas of protecting and implementing sustainable financial schemes, procurement, quantification, and proper management of drugs. In addition, policy makers should decide whether to allow trained health workers at all levels (particularly at health centers) to use lifesaving IMCI prereferral drugs, as discussed later in Drug Selection.

Associated Costs of Drug Donations

In developing a donation policy and strategies, consideration must also be given to the cost of logistics and refresher training of health personnel to manage and prescribe these drugs. The district hospitals and district health management team should make budgetary provisions (or get government support) to distribute the rural kits on time to all the rural health centers.

Drug Selection

The Zambian drug selection policies reduce the number of drugs at each level of the health system, which has a number of benefits. Managing a reduced number of drugs can—among other things—improve distribution management, rationalize prescribing patterns, and reduce costs. In Zambia, the referral drugs used to treat children's illnesses at health center levels are not in stock in the health centers. The responsibility and process of including and developing such a list in the Zambian EDL lies in the hands of the Zambian National Formulary committee. To date, the ZNF is still opposed to the idea of allowing IMCI referral drugs to be included in the rural drug kits. In the meantime however, the CBOH has adopted a pragmatic approach to the problem and has allowed health workers trained in IMCI case management to prescribe and dispense these drugs. The final responsibility to who should or should not use these drugs falls upon the NDP, the ZNF, the District Health Management teams, and the District Health Directors. The situation in the mission hospitals is different, and all the drugs commonly used to manage IMCI conditions were available.

Harmonizing Standard Treatment Protocols

In light of what was discussed in the body of the report, harmonizing treatment protocols and developing clear guidelines to manage emergencies and referrals from the primary health care level to the secondary or tertiary level need to be developed and agreed upon by all stakeholders. This is an important matter especially if the MOH and CBOH have plans to roll out IMCI to districts other than the four studied here. The challenge in Zambia in both the public and private sectors is not only to provide training in rational use of drugs and to harmonize treatment protocols, but also to provide the targeted training of the health workers to improve their skills in clinical diagnosis and prescriptions of drugs for children's illnesses. Improving this aspect will ultimately lead to improved use of drugs.

Policy

Improving child health is a vital element of the health sector reforms. The Zambia NDP is established and has been integrated in support of the national health sector development. The CBOH should, within the framework of the national drug policy, bring together all interested parties to focus on the commitment to improve the pharmaceutical sector in general and to provide a framework for action to implement the IMCI objectives in securing essential drugs for priority childhood illnesses.

Recommendation

Ensure commitment by all stakeholders to national drug policies, and address IMCI drug issues such as integration of IMCI referral drugs in health centers and monitor their use at all levels of the health system.

Access

Access to essential drugs, especially for the poor population in Zambia, is a key priority for the CBOH. Access to essential medicines depends on—

1. Sustainable financing through government and new financing sources, such as insurance, community health funds, cost recovery programs, incentive-based programs, and so on

2. Affordable prices, through bulk or pool procurement of supplies to achieve economies of scale and implement cost-effective procurement practices

One approach to improving availability and access is for the MOH to improve procurement procedures and allow the CBOH to play its part. Although distribution functions have been contracted to a private company, they have proved to be very costly for the government, and policy considerations must be made for local treatment of children especially if the problems and diseases can be treated at the health center level by ensuring the provision of essential IMCI drugs at this level. Alternative approaches to hospital treatment through community-based facilities and home care should also be considered.

Recommendations

1. Ensure the implementation of various cost-effective and efficient procurement practices such as drafting standard operational procedures, regular auditing, and protecting the drug budget account.

2. Train district staff on quantification methods, sustainable financing mechanisms, drug management, and budgeting.

3. Customize monitoring tools for district level and health centers to monitor availability of essential drugs.

4. Develop guidelines to improve availability by incorporating public/private partnerships especially with NGOs and religious institutions to the national health sector strategies.

Quality of Drugs

The ultimate goal of drug regulation is the promotion and protection of public health. Zambia is investing scarce human and financial resources to improve drug regulation such as setting up the Pharmacy and Poisons Board, developing norms and standards for the whole sector, and so on; however, enforcement is still a major challenge. Inspections of premises and quality controls of imported goods (especially in the private sector) are not regularly enforced. Parents resort to drug sellers at marketplaces or to unqualified personnel to get information during over-the-counter purchases. Given the health and economic impact that this situation has on households, providing simple information inserts or posters in the public and private sectors should help contain the problem of use and quality concerns.

Recommendations

The CBOH should create a mechanism of information exchange on drug quality from the central level to the districts and support the Pharmacy and Poisons Board in developing informational campaigns to ensure quality of all drugs used to treat children's illnesses.

Rational Use and Treatment Management

Irrational prescribing and dispensing continue to be a problem and a health hazard in Zambia in spite of the vigorous annual campaigns by the Zambia Pharmaceutical Society. The irrational use of drugs (especially antibiotics) is widespread and is exacerbated by the chronic shortages of vital drugs in public health institutions. As discussed earlier, because it is also an out-of-pocket expenditure for the caretakers, it is a source of impoverishment of already poor sections of the population. The challenge in Zambia in both the public and private sector is not only to provide training in rational use of drugs and harmonize treatment protocols, but also to provide the appropriate training and materials needed for the health workers to improve their skills in clinical diagnosis of children's illnesses. Improving this aspect will ultimately lead to improved use of drugs.

Recommendations

1. CBOH should work to support and incorporate all training components for rational drug use, including clinical diagnosis and use of drugs by prescribers, dispensers, and consumers.

2. All stakeholders—university teaching hospitals, regulatory bodies, schools, pharmacies, pharmaceutical wholesaler industries, health personnel, and international agencies, and the media—in Zambia have a role to play to ensure that therapeutically sound and cost-effective drugs are used by the public at large.

3. Standard treatment protocols for child health should be harmonized.

Training and District-Focused Approach

Undoubtedly difficulties exist in implementing the IMCI strategies especially when resources are scarce. In spite of theses problems in Zambia with the drug supply and the use of first-line drugs at the health center level, the study showed that health workers who were trained in IMCI had the skills and the knowledge to treat children. We were also informed that IMCI-trained personnel organized training sessions and shared their knowledge with other colleagues.

A positive effect of the IMCI training had been reported by BASICS in 1998 at the rational drug use workshop in Siavonga. BASICS representatives reported that workers who were trained could correctly manage 82 percent of diarrheal cases after three months of follow-up and 60 percent after one year. There are some positive outcomes in child health. Immunization services have improved, and weighing of infants and counseling of parents increased dramatically in the last 12 months. These positive results combined with training in drug management and rational drug use should contribute in the long run to a steady reduction in childhood mortality in Zambia.

Recommendation

1. Incorporate training of management and rational use of drugs to the IMCI training component.

2. Introduce district-based tools to improve drug management and inventory systems.

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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

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

2. Percentage of 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

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

Annex 2. Data Collectors

1. Noeleeen Kalamatila	Pharmacy Technologist
2. Josephine Nonde	Clinical Officer
3. Bernice Mwale	Pharmacist
4. Graham Samungole	Clinical Officer
5. Mildred Mulenga	Pharmacy Technologist
6. Tabita Ilunga	Clinical Officer
7. Dr. Michael Chanda	Medical Officer
8. Genevieve Mwale	Registered Nurse/Midwife
9. Loyce Lishimpi	Pharmacist
10. Victor Mwape	Clinical Officer
11. Euphrasia Mtonga	RN/Midwife
12. Yvonne Tembo	Pharmacy Technologist
13. Delia Banda	RN/Midwife
14. Anayawa Mundia	RN/Midwife
15. Phenny Katakala	Clinical Officer
16. Elizabeth Musunga	RN/Midwife
17. Margaret Mpundu	Clinical Officer

Annex 3. Zambian IMCI Tracer List

1. Oral rehydration salts (ORS)
2. Cotrimoxazole tablets 20/100mg
3. Cotrimoxazole syrup 40/200mg per 5ml
4. Amoxycillin tab 250mg
5. Amoxycillin syrup 125mg per 5ml
6. Chloramphenicol IM 1g in 5ml sterile water
7. Gentamicin IM 20mg per 2ml ampoule
8. Benzyl penicillin 1MU/vial
9. Nalidixic acid tablet 250mg
10. Doxycycline 100mg tablets
11. Erythromycin 250mg tablets
12. Erythromycin syrup 125mg per 5ml
13. Chloroquine tablets 150mg base
14. Chloroquine syrup 50mg (base) per 5ml
15. Sulphadoxine/pyrimethamine tablets 500/25mg (Fansidar)
16. Quinine IM 300mg/ml
17. Mebendazole tablet 100mg
18. Ferrous sulfate tablets 50mg
19. Folic acid tablet 5mg
20. Gentian violet solution
21. Tetracycline eye ointment 1 percent
22. Vitamin A 200,000IU
23. Paracetamol tablets 100mg
24. Paracetamol 24mg/ml syrup
25. Diazepam 5mg/ml injection
26. Salbutamol 2mg tablets
27. Dextrose 50% injection
28. Ringer’s lactate liter
29. Oral polio vaccine (OPV)
30. Measles vaccine
31. DPT vaccine
32. BCG vaccine
33. Syringe and needle
34. Thermometer
35. Intravenous set
36. Nasogastric tubes

Annex 4. Zambia Information Statistics

Maternal and Child Health Statistics

Basic Indicators	Total Population	Population under 5	Population under 18	Annual No. of Births	GNP per Capita
	8,781,000	1,584,000	4,844,000	372,000	US $ 370

Mortality	Infant Mortality Rate (per 1,000 live births)	Under 5 Mortality Rate (per 1,000 live births)	Annual No. of Deaths of under 5
	112	202	75,000

Immunization	BCG	DPT3	Polio3	Measles	TT2
% fully immunized (1-year-old children)	81	70	70	69	—

Reproductive Health	Total Fertility Rate	Contraceptive Prevalence	Maternal Mortality Ratio (per 100,000 live births)
	5.5	26	650

Source: UNICEF Country Statistics, 1999.

Estimated Number of People Living with HIV/AIDS

Estimated Number of Adults and Children Living with HIV/AIDS, End 1999			
Adults & children	870,000		
Adults (15–49)	830,000		
Women (15–49)	450,000		
Children (0–14)	40,000		
Estimated Number of Deaths Due to AIDS During 1999			
Adults and children	99,000		
Estimated Number of Orphans* Since the Beginning of the Epidemic			
Cumulative orphans	650,000		

Source: UNAIDS Epidemiological Fact Sheet, 2000 update.

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

Annex 5. Number and Distribution of Health Facilities

Province	Population	RHC No.	UHC No.	DH No.	GH No.	CH No.	SH No.	ODH No.	OH No.	OHC No.
Central	1,048,006	59	11	5	1	0	1	0	1	18
Copperbelt	1,916,870	34	77	4	0	2	1	3	7	111
Eastern	1,376,972	126	1	3	1	0	0	1	4	3
Luapula	755,103	89	1	0	1	0	1	3	1	8
Lusaka	1,644,320	41	30	0	0	1	1	2	1	11
Northern	1,267,881	113	1	5	2	0	1	1	1	13
Northwestern	673,248	103	3	3	1	0	0	1	5	18
Southern	1,340,593	116	20	6	2	0	0	1	3	29
Western	809,839	87	3	4	1	0	0	1	4	5
Total	**10,832,832**	**768**	**147**	**30**	**9**	**3**	**5**	**13**	**27**	**216**

Sources: *Health Planning Guide, 2000.* Infrastructure Unit, MOH.

Note: RHC = rural health center
UHC = urban health center
DH = district hospital
GH = general hospital
CH = central hospital
SH = specialized hospital
ODH = other district hospital (mines)
OH = other hospital (mission)
OHC = other health centers (mission)

Annex 6. MOH Price as % of Median International Price

Product (name and strength)	MOH Comp Unit Price (US$)	Median Int'l Procurement Price/Basic Unit (US$)	MOH Price as % of Int'l Price (%)
Amoxycillin, 250mg/tab	0.0245	0.0208	117.79
Amoxycillin, 30mg/ml	.0075	.0052	144.23
BCG vaccine, 20dose/amp	1.0500	1.2800	82.03
Benzyl penicillin, 1MU/vial	.1250	.1592	78.52
Chloramphenicol, 1,000mg/amp	.2250	.2119	106.18
Choloroquine syrup, 10mg/ml/ml	.0025	.0055	45.45
Choloroquine, 100mg/tab	.0052	.0060	86.67
Choloroquine 150mg/tab	.0070	.0083	84.34
Clinical thermometer, 1pac/pce	1.0200	.2742	371.99
Cotrimoxazole, 20/100mg/tab	.0023	.0035	65.71
Cotrimoxazole, 8/40mg/ml	.0025	.0043	58.14
Dextrose, 50mg/ml	.9100	.7400	122.97
Diazepam, 5mg/ml	.0024	.0403	5.96
Doxycycline, 100mg/tab	.0122	.0123	99.19
DPT vaccine, 20dose/amp	.7000	.1302	537.63
Erythromycin, 250mg/tab	.0345	.0365	94.52
Erythromycin, 25mg/ml	.0012	.0113	10.62
Folic acid, 5mg/tab	.0009	.0019	47.37
Gentamicin, 10mg/ml	.2500	.0452	553.10
Gentian violet sol, .5mg/ml	.0140	.0552	25.36
Iron (ferrous sulfate) 50mg/tab	.0012	.0020	60.00
IV sets, 1 pac/pce	.2299	.2829	81.27
Measles vaccine, 10dose/amp	1.1300	1.5800	71.52
Mebendazole, 100mg/tab	.0026	.0058	44.83
Nalidixic acid, 250mg/tab	.0992	.0211	470.14
Nasogastric tube, 1pac/pce	.4181	.2628	159.09
Oral polio vaccine, 10dose/amp	.0700	.1296	54.01
Oral rehydration salts, 1pac/pac	.0600	.0620	96.77
Paracetamol syrup, 20mg/ml	.0091	.0049	185.71
Paracetamol, 100mg/tab	.0010	.0022	45.45
Quinine, 300mg/ml	16.2500	13.0300	124.71
Ringer's lactate, 1000ml/amp	.6000	1.1200	53.57
Salbutamol, 2mg/tab	.0010	.0024	41.67
Sulfadoxine/pyrim, 525mg/tab	.0275	.0272	101.10
Syringe/needle, 1pac/pce	3.9900	.0125	0.00
Tetracycline opht, 3mcg/gm	.1000	.0317	315.46
Vitamin A, 2m IU/tab	.0260	.0207	125.6
All drugs			128.88

Annex 7. Percent of Days Out of Stock

Product (name and strength)	Percent of Days Out of Stock (%)
Amoxycillin, 250mg/tab	40.44
Amoxycillin, 30mg/ml	29.27
BCG vaccine, 20dose/amp	0.00
Benzyl penicillin, 1MU/vial	21.83
Chloramphenicol, 1,000mg/amp	33.67
Chloroquine syrup, 10mg/ml/ml	NA
Chloroquine, 100mg/tab	NA
Chloroquine, 150mg/tab	16.23
Clinical thermometer, 1pac/pce	34.25
Cotrimoxazole, 20/100mg/tab	53.35
Cotrimoxazole, 8/40mg/ml	29.07
Dextrose, 50mg/ml	22.47
Diazepam, 5mg/ml	14.26
Doxycycline, 100mg/tab	19.09
DPT vaccine, 20dose/amp	0.00
Erythromycin, 250mg/tab	27.65
Erythromycin, 25mg/ml	46.17
Folic acid, 5mg/tab	30.04
Gentamicin, 10mg/ml	15.72
Gentian violet sol., .5mg/ml	25.26
Iron (ferrous sulfate) 50mg/tab	22.61
IV sets, 1 pac/pce	0.00
Measles vaccine, 10dose/amp	00.30
Mebendazole, 100mg/tab	18.29
Nalidixic acid, 250mg/tab	46.94
Nasogastric tube, 1pac/pce	58.54
Oral polio vaccine, 10dose/amp	0.00
Oral rehydration salts, 1pac/pac	28.40
Paracetamol syrup, 20mg/ml	61.37
Paracetamol, 100mg/tab	29.68
Quinine, 300mg/ml	8.53
Ringer's lactate, 1000ml/amp	13.54
Salbutamol, 2mg/tab	21.40
Sulfadoxine/pyrimethamine, 525mg/tab	24.21
Syringe/needle, 1pac/pce	28.49
Tetracycline ophtalmic, 3mcg/gm	41.51
Vitamin A, 2m IU/tab	27.93
All drugs	23.81

NA = not available