Improving Hospital Management Skills in Eritrea: Costing Hospital Services Part 1, 2001-2002

November 2003

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Funded by:
U.S. Agency for International Development

Order No. TE 033

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November 2003

Recommended Citation

Musau, Stephen N. November 2003. *Improving Hospital Management Skills in Eritrea: Costing Hospital Services, Part 1, 2001-2002*. Bethesda, MD: The Partners for Health Reform*plus* Project, Abt Associates Inc.

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Contract/Project No.: HRN-C-00-00-00019-00

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Abstract

Information on the costs of providing health care services is critical in the decision-making process of any ministry of health. In many developing countries, such information is not readily available due to the inadequacy of the financial information systems to routinely produce useful information. This is often coupled with a lack of skills to do ad hoc cost analyses that would help bridge this information gap. In a vicious circle, the demand for financial information by health care managers is virtually non-existent, and this contributes to the paucity of such information since those who should produce it are not under any pressure to do so.

In contrast, the Eritrean Ministry of Health has expressed the need for good financial information in its efforts to reform the health sector. Hospitals consume a large portion of the resources available to the Ministry; thus, it is important to know how much it costs to provide hospital-based health care. This report describes the beginning of a process to address this need. The costing work was carried out as part of a technical assistance package to develop hospital management skills of senior staff in the Ministry headquarters and selected hospital and regional health management teams; the management skills targeted include financial management skills. This costing report represents the first phase in the costing of health services in Eritrea.

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Acronyms

MCH	Maternal Child Health
MOF	Ministry of Finance
MOH	Ministry of Health
OB/Gyn	Obstetrics/Gynecology
OPD	Outpatient Department
PHR*plus*	Partners for Health Reform*plus* Project (USAID)
SEMISH	State of Eritrea Management Information for Health
USAID	United States Agency for International Development

CURRENCY CONVERSION: 13.5 Nakfa = US$ 1.00

Acknowledgments

The author acknowledges with gratitude the valuable input received from the Hospital Management Teams of Mekane Hiwet Pediatric Hospital, Keren Hospital, and Dekemhare Hospital. He is particularly indebted to the hospital directors for their assistance in the collection of data, review of their hospital costing results, and helpful suggestions in the interpretation of the results.

The insightful comments of the Minister of Health and senior staff at the Ministry, as well as from Linda Lou Kelly, USAID/Eritrea, were greatly appreciated.

This study was made possible with funding from USAID through the PHR*plus* project under contract number HRN-C-00-00-00019-00.

Executive Summary

Introduction

This cost analysis is part of the ongoing technical assistance to the Ministry of Health (MOH), Eritrea, to strengthen financial management systems at three pilot hospitals: Mekane Hiwet Pediatric Hospital (national referral hospital), Keren Hospital (regional), and Dekemhare Hospital (community). The analysis provides needed information to the hospitals and the Ministry on the costs of providing hospital-based health care. By comparing cost information from the three hospitals, it also provides indications of cost efficiency in service delivery. Results of the study also were used in financial management training given to members of the Hospital Management Teams and Zonal Health Management Teams.

The analysis of hospital costs was designed to accumulate costs by hospital inpatient and outpatient departments (also referred to as cost centers). The costing approach adopted is the "step-down" approach whereby costs are allocated to cost centers starting with each cost center's direct costs and then allocating the indirect or overhead costs to make sure that each cost ultimately is borne by a final cost center.

This report is part one of two parts; it contains the costs and activities for 2001 at Keren Hospital and for 2002 at the Pediatric Hospital and Dekemhare Hospital. The second part will look at 2003 costs and service data of the pilot hospitals.

Summary of Costing Results

The following tables give a comparative summary of the costing results for the three pilot hospitals. All amounts are in Nakfa (Nk 13.5 = $).

Costs and Revenues

Table ES1 gives an overview of the revenues and expenditures of the three hospitals. Expenditures are presented as they appear in the annual reports of hospital finance departments except for the expenditures on drugs and medical supplies, which have been adjusted to reflect the cost of drugs and supplies issued to user departments. (The hospital accounting systems do not capture all the costs of drugs and medical supplies received in the hospitals.)

The hospitals show a significant potential for user-fee financing of expenditures. The table shows that a significant level of cost recovery has been achieved despite the low fee levels and a liberal (and not well-controlled) system of granting free services to the poor.

Table ES1: Summary of Revenues and Expenditures, by Hospital

Hospital Name	Mekane Hiwet Pediatric Hosp.		Keren Hospital		Dekemhare Hospital	
	Nakfa (Annual) 2002	%	Nakfa (Annual) 2001	%	Nakfa (9 months) 2002	%
EXPENDITURE						
Salaries	2,732,087	44%	2,246,106	47%	1,078,100	48%
Drugs and medical supplies	2,399,689	38%	1,405,155	30%	713,942	32%
Food services	652,756	11%	438,000	9%	157,553	7%
Electricity and water	128,873	2%	354,630	8%	23,550	1%
Other indirect costs	324,332	5%	295,860	6%	279,400	12%
Total expenditure	6,237,737	100%	4,739,751	100%	2,252,545	100%
REVENUE (user fees)						
Pharmacy	85,485*	7.5%	627,639	67%	158,790	50%
Treatment (all other patient fees)	1,047,947	92.5%	308,674	33%	158,283	50%
Total user fee revenue	1,133,432	100%	936,313	100%	317,073	100%
Net funding from Ministry of Finance	(5,104,305)		(3,803,438)		(1,935,472)	
Overall cost recovery	18%		20%		14%	
Cost recovery on non-wage expenditure	32%		38%		27%	

* A misallocation of fees between pharmacy and treatment resulted in a very low amount being attributed to pharmacy. Pharmacy fees are also reduced by a hospital policy that all fee-paying outpatients should purchase their prescriptions from outside chemists.

Unit Costs by Cost Center

Unit costs are derived from the total costs of service delivery in each department and the volume of output of that department. Table ES2 shows overall inpatient and outpatient unit costs in each pilot hospital.

It is important to recognize that these costs only show the situation at the current level of quality of health care. The numbers will change in the future to reflect quality improvements in staffing and in other resource inputs such as drugs and medical supplies. This will give the MOH an idea what it should cost to provide services at specified levels of quality, and help it to do financial planning for the hospitals.

Table ES2: Overall Unit Costs by Hospital, in Nakfa

Service	Pediatric Hospital			Keren Hospital			Dekemhare Hospital		
	Output (Visits, Bed days)	Cost per Unit	Bed Occ. %	Output (Visits, Bed days)	Cost per Unit	Bed Occ. %	Output (Visits, Bed days)	Cost per Unit	Bed Occ. %
Outpatient services	30,830	46.5		36,402	44.6		16,337	71.5	
Inpatient services	54,788	91.3	79%	46,216	67.4	70%	6,122	177	37%

The unit costs for Dekemhare Hospital are higher compared to the other two hospitals. This is partly explained by its low volume of services. The hospital is just over two years old and was upgraded from a health center. Occupancy rates are very low as are outpatient volumes compared to the hospital's level of staffing and other overheads. Dekemhare normally refers complex inpatient cases to Asmara, and this contributes to its lower average lengths of stay. Keren Hospital and the Pediatric Hospital do not refer to any other institution for inpatient care and therefore their bed occupancy is higher as is their average lengths of stay (Table ES3).

Table ES3: Average-Length-of-Stay Comparisons

Ward Type	Pediatric Hospital	Keren Hospital	Dekemhare Hospital
Obstetrics/Gynecology	N/A	2.4	2.2
Medical	N/A	6.5	4.9
Surgical	7.2	12.2	5.9
Pediatric*	9.6	6.5	N/A

* The Mekane Hiwet Pediatric Hospital has four pediatric wards – Neonatal (0–1 month), Ward A (1–12 months), Ward B (1–5 years), Ward C (5–14 years) – and one surgical ward(Ward F).

A closer look at the composition of the unit costs reveals other variations that will be discussed with hospital management as data are refined and areas of improvement in cost management identified. Table ES4 breaks the above unit costs into their variable (drugs, food, and other supplies) and fixed (staff and administrative overheads) components.

Table ES4: Per Unit Costs of Variable and Fixed Costs (in Nakfa)

Cost Type	Pediatric Hospital		Keren Hospital		Dekemhare Hospital	
	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient
Variable costs per unit (drugs, food etc)	19.5	44.2	19.7	24.4	34.5	50.4
Fixed costs per unit (salaries, etc.)	27.0	47.1	24.9	43.0	37.0	126.6
Total	46.6	91.3	44.6	67.4	71.5	177.0

Although the Pediatric Hospital has the best capacity utilization of the three hospitals, its unit costs are higher than those of Keren Hospital. Reasons for this may include:

- Staff costs are about 22 percent higher in the Pediatric Hospital than in Keren, though Keren has a larger staff – 12 doctors and 81 nurses, compared to 11 doctors and 74 nurses for the Pediatric Hospital. The Pediatric Hospital is in the capital city, Asmara, where costs are higher, and employs more clinical specialists as well as better-qualified administrative staff.

- The major inpatient variable costs, drugs/supplies and food, are much higher per day in the Pediatric Hospital than in Keren. Food is 49 percent higher, and drugs are 70 percent higher. Such differences may result from case mix, inefficiency, and other losses and waste.

Drug costs per patient day (see Table ES5) display such variation that more work is needed to verify the reasons. While case mix will play a role in this variation, it does not explain why the smallest hospital uses nearly two times more drugs per patient day than the national referral hospital

and three times more than the regional hospital. The poor recording of drugs issued to departments may partly explain this anomaly, as the figure could well include some medical equipment.

Table ES5: Drug Costs per Patient Day

	Pediatric Hospital	Keren Hospital	Dekemhare Hospital
Total cost of drugs	2,399,689	1,405,155	713,942
No. of patient days	60,954	53,496	9,389
Drug cost per patient day	39.4	26.3	76.0

Capital Costs

The costs shown above do not include capital costs, e.g., depreciation of equipment, vehicles, and buildings, as this information was not readily available.

Uses of Cost Analysis

The cost analysis of the three hospitals provides useful information to the MOH and the hospital management teams in a variety of areas:

- **Budgeting**: as hospitals start to prepare their budgets for the coming fiscal year, they will use the new information to make better estimates of their funding needs. This information should also be used to negotiate more reasonable budget allocations with the MOH and Ministry of Finance (MOF).

- **Cost Control**: the hospital management teams should look at the unit costs of outputs in each area of the hospital and ask themselves the following questions: Why are the costs at the level that they are? Is it possible to produce services more cost efficiently?

- **Training**: cost analysis results will continue to be used in the ongoing training on financial management. Trainings will focus on improving management use of this information to deliver services more cost efficiently.

- **Quality of care**: cost information alone does not allow for conclusive judgments about the hospital operations; quality of care being delivered at each hospital must also be known. Costing results should be interpreted with care and, where possible, linked to the quality assurance work going on at these hospitals.

- **Planning**: the MOH should begin to get a picture of what it costs, at current levels of quality, to provide hospital-based care. This information should feed into the planning of resource allocations to hospitals, after adjustment for any obvious inefficiencies.

- **Efficiency** in the provision of services can be monitored by comparing the unit costs of different departments over a period of time. Comparisons can also be made with other hospitals. Improving the cost efficiency of hospitals is a critical ingredient in the overall financing of health care in the country; more efficient hospitals make it possible for more resources to be made available for much-needed primary health care.

- Unit costs can be useful in decisions on setting of **fee levels**. Even though the MOH does not emphasize cost recovery, the unit cost information can give an indication of the levels of subsidy for different services.

- The process of analyzing costs by department can give managers a good idea about how their hospital is organized from a cost point of view and can help them to begin to place **responsibility for costs** and revenues on the heads (managers) of each cost center. This is a major step towards improving a hospital's cost efficiency.

Issues Arising from Cost Analysis

- **Hospital Management Information**: The management information systems in the pilot hospitals are typical of MOH hospitals in Eritrea. Most data collected are used to prepare reports for external (MOH or MOF) consumption. It appears that hospital management uses little of the information for decision making.

- **Workload data:** Workload data are collected regularly and submitted to SEMISH (State of Eritrea Management Information for Health) on a monthly basis. No feedback is received from SEMISH and it is unclear who makes use of these data. Some of the data that is critical for hospital management is not required by SEMISH, for example, inpatient workload by patient days, admissions and discharges.

- **Accounting systems:** The accounting system does not accurately capture all recurrent costs, particularly drugs and medical supplies. In order for the finance department to be a useful source of information to management, it is important that all costs are accounted for.

- **Drugs and medical supplies:** Data on the use of drugs and medical supplies were not readily available. This is the second most important cost item in the hospital after staff costs. It is important therefore that there be a system that can adequately track the issue of medical supplies from the pharmacy to the user departments, especially the wards. Drugs are closely monitored in the outpatient pharmacy and adequate records kept and reports prepared. Similarly, it is important to establish systems within the user departments themselves to ensure that, where possible, there is a link to patient records

1. Introduction

1.1 Background

The Partners for Health Reform*plus* (PHR*plus*) project is providing technical assistance in hospital reform to the Ministry of Health (MOH) of Eritrea. A part of this technical assistance is the strengthening of the financial management systems in hospitals at the three levels of the referral chain: community, regional, and national. Three pilot hospitals, one at each level, were selected for management strengthening. Various aspects of financial management are being addressed, including basic training on hospital management and strengthening of financial information systems and internal controls to improve revenue collection and improve cost efficiency and control.

The health system is organized into three levels: primary, regional, and national referral. The primary level comprises health stations, health centers, and community hospitals. There are six regions (*zobas*) in Eritrea, each served by a regional hospital. The national referral hospitals are based in the capital city, Asmara.

The three hospitals included in this costing work were the Mekane Hiwet Pediatric Hospital (national referral hospital), Keren Hospital (regional), and Dekemhare Hospital (community). Table 1 gives a brief overview of each.

Table 1: Overview of Pilot Hospitals

	Mekane Hiwet Pediatric (National)	Keren (Regional)	Dekemhare (Community)
Location of hospital	National capital	Regional capital	Small town
Number of beds	191	182	60
Occupied bed days	54,788	46,216	6,122
Bed occupancy rates	79%	70%	28%
Outpatient visits	26,487	36,402	16,337
Total number of staff	184	193	90
Number of doctors	11	12	4 (+ 1 visiting surgeon)
Number of nurses	74	81	34

* A surgeon visits the hospital twice a week.

1.2 Health Sector Financing

Current public health sector expenditures are estimated to be 2.9 percent of GDP (World Bank 2002); however, total health spending is unknown. The Eritrea Household Health Status, Utilization and Expenditure Survey (EHHSUES) was conducted in two of the six zobas in 1997, but was interrupted by the border conflict with Ethiopia in 1998. The EHHSUES was resumed and completed in 2002 (including new surveys in the two zobas done in 1997).

The MOH introduced cost sharing in 1996 in health facilities in the form of user fees for registration, diagnostic services (laboratory and x-ray), and the purchase cost of drugs. The user-fee policy was supposed to have been reviewed in 1998 but had to be put on hold due to the border conflict with Ethiopia. There is an exemption policy for the indigent and this is administered by the Ministry of Local Government; patients are given a "Poverty Certificate" which entitles them to free care on presentation at the hospital. The exemption system is prone to abuse and discussions are going on to try to improve it.

All revenue generated by the hospital through user fees is remitted to the Ministry of Finance (MOF). There are proposals for some of this revenue to be retained at the hospitals but a decision has not been made yet. Part of the work that PHR*plus* is doing in the hospital reforms is to strengthen financial management systems in hospitals so that, when a decision is made to give them greater autonomy (including the retention of user fee revenue), they will already have sound systems that enable them to control and utilize such revenue effectively.

1.3 Purpose of the Cost Analysis

The purpose of this cost analysis is to provide much needed information to the hospitals and the Ministry of Health on the costs of providing hospital-based care. In particular:

- The results show what it costs to provide the present level of quality of health care at the three pilot hospitals. This information can be extrapolated to look at other hospitals of similar size and case mix.
- Comparing the results of the three hospitals indicates cost efficiency variations from hospital to hospital.
- At a later stage, the unit costs calculated in this analysis can be adjusted to provide information on how much it would cost to provide services at different levels of quality. For example, adjustments can be made to the staffing levels and other variables to show decision makers the potential cost impacts of the various scenarios. These options will have greater relevance to the MOH than to the hospital and will be taken up at that level.
- All the above uses are also necessary components of any budgetary allocation system that wants to look at the actual costs of delivering health care and particularly if cost efficiency measures are to be built into the calculation of what a hospital gets from Treasury.

1.4 Organization of This Report

The rest of this report is organized as follows: Chapter 2 presents the overall methodology, followed by the cost analysis reports for each of the three pilot hospitals in Chapter 3. Chapter 4 discusses the findings from a broader perspective, including the key data collection issues encountered.

This report is part one of two parts; it contains the costs and activities for 2001 of Keren Hospital and 2002 of the Pediatric Hospital and Dekemhare Hospital. The second part will look at 2003 costs and service data.

2. Methodology

2.1 Management Accounting System for Hospitals

The cost analysis was conducted using methodology that has been developed by PHR*plus* for health care costing. This costing tool, "Management Accounting System for Hospitals" (MASH) is developed in an Excel workbook with linked worksheets and is adaptable to individual hospitals. It is designed to provide cost information in sufficient detail to enable managers to identify the total cost of operating each department (or "cost center") within the hospital, as well as the average cost of the services produced by each department.

The analysis of hospital costs was designed to accumulate costs by department or cost center. Cost centers used in the analysis were of three types: **administrative** (to accumulate administrative costs that are then shared out among the patient-related cost centers); **final** (medical departments that provide "final" services directly to patients, e.g., wards, outpatient clinics); and **intermediate** (those that provide support, e.g., diagnostic services, to the final cost centers). The "step-down" approach is used, whereby costs are allocated to cost centers starting with each cost center's direct costs and then allocating the indirect or overhead costs, making sure that each cost ultimately is borne by a final cost center.

2.2 How Costs Were Accumulated

The accumulation of costs by department, or cost center, was achieved by first charging each cost center with all its *direct costs*. Direct costs are those that can be directly identified with or traced to a cost center. For example, the salary cost of a laboratory technician is a direct cost of the laboratory. The drugs consumed in a ward are a direct cost of that ward. Because the hospitals in the study do not keep financial records that are detailed enough to enable the study team to do this perfectly, the team had to estimate some costs. The two largest direct cost categories are medical supplies and staff:

- Drugs and medical supplies: The hospital pharmacies provided details of the consumption of drugs and medical supplies for a sample period of one month (in Dekemhare and Keren Hospitals), and six months (Pediatric Hospital). (The outpatient pharmacy in Keren was additionally able to provide the annual cost of drugs dispensed to outpatients.) On the basis of this information, the annual consumption of drugs was allocated to each cost center in proportion to its consumption during that one month. A problem that arose in using the data generated this way was that, during this month, very little consumption was recorded for the X-ray department. The preliminary allocation of medical supplies consumption was therefore understated and will be corrected once the pharmacy store finalizes a more detailed analysis of consumption. This is one area that the hospital will need to work on to improve the tracking of drug consumption.

- Staff costs: The total staff costs (basic salaries and benefits) were allocated to cost centers based on the basic salaries of staff working in each cost center. It was assumed that the benefits would be in direct proportion to the basic salaries. Data for this purpose were obtained from the personnel department (list of all staff and their designation); the matron (work schedules for nursing staff), and the medical director (work schedules for doctors).

After the allocation of all direct costs was completed, *indirect costs* were allocated. Indirect costs are those that cannot be directly traced to or associated with a particular cost center or product. For example, the salary of the telephone operator cannot be directly attributed to any cost center, though all cost centers benefit from the services of the telephone operator. Therefore, indirect costs were allocated to cost centers on bases that proximate the closest relationship between the cost and the service. This process is, at best, an estimate. However, it is important to bear in mind that indirect costs are a much smaller percentage of total costs than are the more straightforward direct costs – in this study, direct costs allocated for between 86 percent and 93 percent of the total hospital costs.

The allocation bases used (also referred to as allocation statistics, apportionment statistics, or cost-drivers) are shown in Table 2. When no good allocation base existed, the study used the proportion of each cost center's direct costs to the total direct costs as the allocation base. In this sense, direct costs serve as the "last resort" allocation variable.

Table 2: Allocation Bases

Indirect costs	Allocation statistics
Heat	Space
Electricity	Space
Water	Space
Building maintenance	Space
Cleaning	Space
Other administration costs – including transport, telephone	Direct costs

The total cost of each cost center is the sum of the direct and indirect costs.

2.3 Outputs

In order to compute average costs (also called unit costs), each cost center's output had to be defined. This output becomes the object for the costing exercise.

Outpatient care cost centers: the unit of output was an outpatient visit. The number of visits reflects the workload of patients treated in the outpatient department and serves as a useful definition of the "product" of the outpatient department. These data were available for most departments. Where data were not reported, they were extracted from the patient registers.

Inpatient care cost centers: Two units of output were used to reflect the volume of inpatient services – the number of patients discharged and the number of patient days. Data on inpatient care were available from matrons; the SEMISH (State of Eritrea Management Information for Health) does not require data on inpatient days, admissions, and discharges in the format that is needed for cost analysis.

2.4 Resources and Costs

Understanding the nature of the resources used in the hospital and how they are related to the outputs/services is key to the costing exercise. For example, various resources (staff, drugs, light, food, administrative support, etc.) are required to provide service to an inpatient each day (a patient day); a cost is associated with each resource. In other words, the cost of providing a service is driven by the resources required to produce that service.

The resources used are usually in the control of a variety of hospital staff. For example, the resources used up by a patient in the ward will be influenced by the doctor (who sees the patient, prescribes medication, and decides how long to keep the patient in the hospital); the head nurse (who influences the use of non-pharmaceutical supplies); the head of the kitchen (who oversees the quantity, quality, and cost of the food that is served).

In order for a hospital to be cost efficient, all the staff who influence costs must make sure that services consume only the resources needed to achieve the desired quality of services provided. Costs do not exist on their own; they are incurred as a result of somebody's decision.

2.4.1 Fixed and Variable Costs

Some resource costs are **fixed**; others are **variable**. The distinction between fixed and variable costs is one of behavior in how they respond to changes in the volume of activity. Fixed costs tend to remain constant even when the volume of activity changes. For example, the number of staff employed in the hospital remains constant even though the volume of patients varies from one day to another. If there is a long-term change in volume, these fixed costs may also change to respond to the new level of activity; they would then remain constant for some length of time. Variable costs change in response to the volume of activity. Examples include the consumption of pharmaceuticals and food; these can be expected to vary with the volume of patients.

The cost analysis provides results in unit costs and further breaks these into their variable and fixed components. This level of detail is important particularly in budgeting; variable costs can be projected on the basis of volume while the fixed costs can be expected to remain constant over the budget period.

2.4.2 Human Resources

Hospital staff is one of the most important and expensive resources, accounting for between 44 percent and 48 percent of total expenditure in the pilot hospitals. In Keren Hospital, staff costs account for 47 percent of the total expenditure. The hospital staff can be grouped into two broad categories: clinical and non-clinical. Clinical staff includes doctors, dentists, and nurses. The cost of clinical staff is allocated to the departments where they work. Information on workstations and schedules was obtained from the matron (for nurses), the medical director (for doctors), and the personnel officer provided a list of all staff and their designation.

Where the work of staff spans more than one department, their cost was allocated on the basis of estimates (through interviews) of the amount of time they normally spend in each area.

Non-clinical staff are subdivided into internal (department level) and external (facility level). The department level (internal) non-clinical staff includes primarily cleaners. External non-clinical

staff comprises the administrative staff (finance, personnel, etc.) and other support functions (kitchen, laundry, etc.).

2.4.3 Fixed Assets (Capital Costs)

Fixed assets are the durable assets in use in the hospital, such as equipment, vehicles, and buildings. The cost of these resources was not included in the analysis due to lack of data on costs. In Eritrea, hospital accounting systems (in common with most public accounting systems) do not capitalize fixed assets. Information on their costs is also not readily available. The failure to include capital costs in the cost analysis underestimates the cost of providing health care and gives an incorrect report on cost recovery. The imprecision will be more pronounced in departments that are capital intensive, such as X-ray, which use expensive equipment, compared to those that are less capital intensive, such as outpatient visits.

It is important to include capital costs in order to get an accurate view of the cost of all resources used in producing health services. This issue will be addressed in the next round of hospital costing. The improvement of financial management systems that is currently underway will also address the proper treatment of capital items in hospital accounting records so that management can keep track of them for planning and pricing purposes.

As the MOH moves to decentralize some functions and authority to the zobas, there are also plans to review the user-fee policy with the aim to recover more of the health care costs from patients. It is important that cost recovery decisions are based on the most accurate data.

3. Costs in Pilot Hospitals

3.1 Mekane Hiwet Pediatric Hospital

The following is a summary of the cost analysis results for the Mekane Hiwet National Pediatric Referral Hospital.

3.1.1 Costs and Revenue

Table 3 lists total costs and revenues for 2002 for the Mekane Hiwet Pediatric Hospital. User-fee revenue is accounted for under two broad categories: Pharmacy and Treatment fees.

Table 3: Total Costs and Patient Fee Revenue 2002, Pediatric Referral Hospital

	In nakfa	%
User-fee Revenue		
Pharmacy	85,485	7.5%
Treatment (X-ray, lab, bed, etc.)	1,047,947	92.5%
Total user-fee revenue	1,133,432	100%
Expenditure		
Salaries	2,732,087	43.8%
Drugs and medical supplies	2,399,689	38.5%
Food	128,873	2.1%
Electricity and water	652,756	10.5%
Other indirect costs	324,332	5.2%
Total expenditure	6,237,737	100%
Net costs (User fees less operating costs)	(5,104,305)	
Percentage funded from user fees (cost recovery)	18%	
Percentage of non-wage expenditure funded from user fees	32%	

It is interesting to note that only three cost categories – staff, drugs/medical supplies, and food – account for most of the costs of the hospital (92.8 percent). This means that once these three cost categories are correct, final unit costs are very reliable. It also means that cost control of only these resources, all quite easy to monitor, would yield the most gains – although the hospital may not have much control over staff costs.

The percentage of hospital expenditure that would be financed by user fees if these fees were retained in the hospital is 18 percent. User fees would also cover 32 percent of non-wage expenditure. This is a significant contribution from patients to the financing of health care at the referral hospital.

The contribution would be even higher if there were tighter control over the volume of free care that is given to those who come to the hospital with a "Poverty Certificate" issued by the Local Administration.

Table 4 shows how the above costs were allocated to the direct patient care departments (outpatient and inpatient). The "Outpatient General" cost center refers to all activity in the outpatient department (OPD) except the Emergency (First Aid) room. Included in OPD General are the IMCI (Integrated Management of Childhood Illnesses) Clinic and the Follow-up Clinic. If hospital management so desires, it is possible to separate out these two clinics and show them as cost centers in their own right.

Table 4: Pediatric Hospital Costs by Department (in Nakfa)

Final cost center	Output		Total costs	% of total hospital cost
	No.of units	Unit		
Outpatient				
Outpatient General	18,081	Visits	997,405	16%
Outpatient Emergency	8,406	Visits	236,157	4%
Outpatient subtotal			1,233,562	20%
Inpatient				
Inpatient Emergency	8,471	Bed days	810,947	13%
Ward A (Neonatal)	6,173	Bed days	764,806	12%
Ward B (1–12 month olds)	13,065	Bed days	1,148,104	18%
Ward C (1–5 yrs olds)	13,180	Bed days	1,039,510	17%
Ward D (5–14 yr olds)	7,965	Bed days	854,860	14%
Ward F (Surgical)	5,934	Bed days	385,948	6%
Inpatient subtotal			5,004,175	80%
Total			6,237,737	100%

3.1.2 Unit Costs

The unit costs by cost center are shown in Table 5, separated into variable and fixed unit costs. The split between the variable and fixed components allows us to see what part of the unit cost can be lowered through an increase in volume of services.

Unit costs are calculated by dividing the total cost for each department (cost center) by the volume of output. For example, the unit cost per outpatient visit at the Pediatric Hospital is 997,405/18,081 = 55.16. A unit cost is therefore influenced by both the size of the numerator (total cost) and the denominator (volume of services). In order to reduce costs per unit, it is necessary to either reduce total costs or increase the volume of services (or both). Total costs are made up of both fixed costs and variable costs. A higher volume of output in any given cost category means that the fixed costs are being shared by an increased number of units, and hence there is a decrease in the cost per unit.

Table 5: Unit Costs by Cost Center

Cost Center	Output (Service volumes)		Total cost Per unit (Nakfa)	DETAILED UNIT COSTS			
				Fixed costs			Variable costs
				Staff costs	Other fixed costs	Total fixed cost	(Drugs, food, etc.)
Outpatient General	18,081	Visits	55.2	28.0	4.0	32.0	23.2
Outpatient Emergency	8,406	Visits	28.1	14.4	2.0	16.4	11.7
Inpatient Emergency	8,471	Bed days	95.7	44.5	6.1	50.6	45.1
Ward A (Neonatal)	6,173	Bed days	123.9	44.9	8.1	53.0	70.9
Ward B (1–12 month olds)	13,065	Bed days	87.9	37.3	5.5	42.8	45.1
Ward C (1–5 yrs olds)	13,180	Bed days	78.9	33.0	5.0	38.0	40.9
Ward D (5–14 yr olds)	7,965	Bed days	107.3	45.4	6.9	52.3	55.0
Ward F (Surgical)	5,934	Bed days	65.0	28.2	4.2	32.4	32.6

Ward A has the highest cost per day. This appears to be due to higher cost of drugs (70.9 Nakfa per day) and also high staff costs per day despite having the highest occupancy rate. According to the matron, the nursing care in the neonatal ward is more intensive than in the other wards.

Table 6 presents inpatient statistics. Bed occupancy in 2002 ranged from 51 percent in Ward F (surgical) to 106 percent in the neonatal ward (Ward A).

Table 6: Inpatient Statistics

Cost Center (Wards)	Beds	Discharges	Occupied bed days	Bed occupancy rate	Average length of stay
Emergency ward	25	5,647	8,471	93%	1.5
Ward A (Neonatal)	16	844	6,173	106%	7.3
Ward B (1–12 month olds)	45	1,515	13,065	80%	8.6
Ward C (1–5 yrs olds)	45	1,115	13,180	80%	11.8
Ward D (5–14 yr olds)	28	936	7,965	78%	8.5
Ward F (Surgical)	32	828	5,934	51%	7.2

3.2 Keren Hospital

The following is a summary of the results of the cost analysis of Keren Hospital. Keren Hospital is the regional referral hospital for the Anseba Region.

3.2.1 Total Costs and User-fee Revenue

Table 7 shows the total costs of running Keren Hospital in 2001. These costs have been adjusted to reflect what was actually spent by the hospital during that year. The major adjustment was in the medical supplies line item, where the financial records did not agree with the records in the pharmacy store; it was therefore necessary to disregard the amounts reported by the finance department and use

those supplied by the pharmacy, because the pharmacy records were more complete. (For a discussion of this issue see also section 4.2.1. The amounts indicated for drugs and medical supplies represent what was issued by the pharmacy to the user departments, and this may not therefore give an exact amount of actual usage.

Table 7: Total Costs and Patient Fee Revenue 2001, Keren Hospital

	In nakfa	% of total
User-fee Revenue		
Pharmacy	627,639	67%
Treatment (X-ray, lab, bed, etc.)	308,674	33%
Total user-fee revenue	936,313	100%
Expenditure		
Staff costs (salaries and benefits)	2,246,106	47.4
Drugs and medical supplies (annual consumption)	1,405,155	29.6
Food	438,000	9.2
Electricity and water	354,630	7.5
Other indirect costs	295,860	6.3
Total expenditure	4,739,751	100.0
Net costs (User fees less operating costs)	(3,803,438)	
Percentage funded from user fees (cost recovery)	19.8%	
Percentage of non-wage expenditure funded from user fees	37.5%	

The cost profile shows that staff costs, medical supplies, and food account for most of the costs of the hospital (86.2 percent). This means that if management can control these costs, they would make the biggest impact on total hospital costs. These three expenditure items also comprise the direct costs for purposes of the cost analysis. The allocation of direct costs to cost centers is more straightforward than that of indirect costs. This gives confidence that the final costs allocated to each cost center are likely to be an accurate reflection of the total costs of running each cost center.

Overall cost recovery is 20 percent. However, excluding staff costs, patient fees cover 38 percent of the rest of the hospital costs. This is a significant contribution from patients.

3.2.2 Costs by Cost Center

The above costs were allocated to each cost center either directly or through the "step-down" method of allocating indirect costs. Once these costs were allocated, the costs of the intermediate cost centers were further allocated to the final cost centers. Table 8 shows the total costs as allocated to each cost center *before* the costs of the intermediate cost centers were allocated to the final cost centers.

The total costs of the intermediate cost centers are allocated to the final cost centers on the basis of the services each cost center receives from the intermediate cost centers. Pharmacy provides services to both the final and the other intermediate cost centers; its costs are the first to be allocated so that each intermediate cost center can receive its share of costs from pharmacy.

Table 8: Costs Before Allocation of Intermediate Cost Centers

Cost Center	Nakfa
Intermediate Cost Centers	
Pharmacy	158,476
Laboratory	162,414
Radiology	183,136
Operating room	533,952
Final Cost Centers	
Outpatient general	777,156
Outpatient dental	157,677
Emergency (outpatient)	211,224
Physiotherapy	81,761
Inpatient obstetrics/gynecology (OB/Gyn)	545,920
Inpatient pediatrics	477,085
Inpatient ophthalmology	304,350
Inpatient medicine	587,613
Inpatient surgery	646,791
Total	4,739,751

Table 9 shows the costs for the final cost centers after the intermediate cost center costs have been allocated.

Table 9: Total Costs by Final Cost Center

Cost center	Output		Total costs	%
	No. of units	units		
Outpatient				
Outpatient General	26,298	Visits	1,148,223	24.2%
Outpatient Dental	1,077	Visits	162,773	3.4%
Outpatient Emergency	8,523	Visits	231,064	4.9%
Outpatient Physiotherapy	504	Visits	81,753	1.7%
Total outpatient costs			1,623,813	34.3%
Inpatient				
OB/Gyn ward	3,581	Bed days	547,594	11.6%
Pediatric ward	8,741	Bed days	502,666	10.6%
Ophthalmic ward	4,563	Bed days	303,164	6.4%
Medical wards	13,963	Bed days	612,390	12.9%
Surgical wards	15,369	Bed days	1,149,775	24.3%
Total inpatient costs			3,115,589	65.7%
Total			4,739,751	100%

Inpatient care consumes about two-thirds of the available resources in the hospital; most of the costs are incurred by the surgical patients. Emergency care, which is provided free of charge to patients, consumes 5 percent of the hospital's resources.

3.2.3 Unit Costs

3.2.3.1 Unit Costs for Final Cost Centers

Table 10 shows unit costs by cost center as well as the corresponding volume of services (output).

Table 10: Unit Costs by Final Cost Center

Cost center	Output (Service volumes)		Total Cost Per unit (Nakfa)	DETAILED UNIT COSTS			
				Fixed costs			Variable costs
				Staff costs	Other fixed cost	Total fixed cost	(Drugs, food, etc.)
Outpatient General	26,298	Visits	43.7	15.5	5.3	20.8	22.9
Outpatient Dental	1,077	Visits	151.1	68.7	40.4	109.1	42.0
Outpatient Emergency	8,523	Visits	27.1	15.2	3.9	19.1	8.0
Outpatient Physiotherapy	504	Visits	162.2	120.2	42.0	162.2	0.0
MCH (OB/Gyn) ward	3,581	Bed days	152.9	75.5	21.1	96.6	56.3
Pediatric ward	8,741	Bed days	57.5	26.9	8.0	34.9	22.6
Ophthalmic ward	4,563	Bed days	66.4	39.2	11.9	51.1	15.3
Medical ward	13,963	Bed days	43.9	19.5	5.3	24.8	19.1
Surgical ward	15,369	Bed days	74.8	40.1	9.2	49.3	25.5

Unit costs are influenced by both the size of the numerator (total cost) and the denominator (volume of services). In order to reduce costs per unit, it is necessary to either reduce total costs or increase the volume of services. The average bed occupancy for Keren in 2001 ranges from a low 33 percent in the Maternal Child Health (MCH) ward (which includes OB/Gyn) to 105 percent in the surgical ward (Table 11).

Table 11: Bed Occupancy Rates

Cost Center (Wards)	Beds	Discharges	Occupied bed days	Bed occupancy rate	Average length of stay
Inpatient OB/Gyn	30	1511	3581	33%	2.4
Inpatient Pediatrics	38	2723	8741	63%	3.2
Inpatient Ophthalmic	30	658	4563	42%	6.9
Inpatient Medicine	44	2141	13963	87%	6.5
Inpatient Surgery	40	1263	15369	105%	12.2

The bed occupancy rate partly explains the high cost per day in the OB/Gyn ward. Other factors include the fact that the OB/Gyn ward has a higher nurse-to-bed ratio of 0.4 than the other wards which have a ratio ranging from 0.23 to 0.28.

3.2.3.2 Capital Costs

The costs shown above do not include capital costs, e.g., depreciation of equipment, vehicles, and buildings, as this information was not readily available. When these results are shared with the hospital and MOH officials, issues of data availability will be raised. It is important that the critical data for producing such management information as this becomes routinely available.

3.3 Dekemhare Hospital

The following is a summary of the results of the cost analysis of Dekemhare Hospital, a community hospital in Mendefera Region. It was upgraded from a health center in 2000.

3.3.1 Total Costs and User-fee Revenue

Table 12 below shows the cost profile of Dekemhare Hospital with costs arranged by budgetary line item for the nine-month period January to September 2002. Again, the more straightforward costs, i.e., staff, medical supplies and food, account for most of the costs of the hospital (87 percent). This means that once an accurate analysis of these three costs is obtained, the final unit costs can be very reliable.

Table 12: Total Costs and Patient Fee Revenue Jan.-Sept. 2002, Dekemhare Hospital

	In nakfa	% of total
User-fee Revenue		
Pharmacy	158,790	50%
Treatment (X-ray, lab, bed, etc.)	158,283	50%
Total user-fee revenue	**317,073**	**100%**
Expenditure item		
Staff costs (salaries and benefits)	1,078,100	48%
Drugs and medical supplies (annual consumption)	713,942	32%
Food	157,553	7%
Electricity and water	23,550	1%
Other indirect costs	279,400	12%
Total expenditure	**4,739,751**	**100.0**
Net costs (User fees less operating costs)	(4,422,678)	
Percentage funded from user fees (cost recovery)	14%	
Percentage of non-wage expenditure funded from user fees	27%	

The percentage of hospital expenditure that would be financed by user fees if these fees were retained in the hospital is 14 percent. User fees would also cover 27 percent of non-wage expenditure. This is a significant contribution from patients in the financing of health care at this community hospital. This level of financing is achieved despite a very liberal policy regarding the treatment of poor patients.

3.3.2 Costs by Cost Center

Total costs and revenues for the first nine months of 2002 by department are shown in Table 13.

Table 13: Dekemhare Hospital Costs and User Fee Revenue (in Nakfa)

Final cost center	Output		Total costs	%
	No. of units	Units		
Outpatient				
Outpatient General	12,941	Visits	977,376	43%
Outpatient Emergency	3,396	Visits	191,864	9%
Outpatient total			1,169,240	52%
Inpatient				
MCH ward (OB/Gyn)	1,602	Bed days	293,292	13%
Medical ward	2,555	Bed days	309,993	14%
Surgical wards	1,965	Bed days	480,020	21%
Inpatient total			1,083,305	48%
Total			**2,252,545**	**100%**

Services in Dekemhare are primarily to outpatients. The hospital used to be a health center and was upgraded to a community hospital in 2000. Occupancy of wards remains low and serious cases are referred to Asmara. A surgeon from Asmara visits twice a week for scheduled surgeries.

3.3.3 Unit Costs

The unit costs by cost center are shown in Table 14, split between variable and fixed unit costs.

Table 14: Unit Costs by Cost Center

Cost center	Output (Service volumes)		Total Cost Per unit (Nakfa)	DETAILED UNIT COSTS		
				Fixed costs		Variable costs
				Staff Costs (salaries)	Other fixed cost	(Drugs, food etc)
Outpatient General	12,941	Visits	**75.5**	24.8	9.6	41.1
Outpatient Emergency	3,396	Visits	**56.5**	37.8	9.3	9.45
MCH ward	1,602	Bed days	**183.1**	93.2	25.5	64.4
Medical ward	2,555	Bed days	**121.3**	72.5	16.3	32.5
Surgical ward	1,965	Bed days	**244.3**	149.7	32.3	62.3

Unit costs are influenced by both the size of the numerator (total cost) and the denominator (volume of services). In order to reduce costs per unit, it is necessary to either reduce total costs or increase the volume of services. The average bed occupancy for Dekemhare was 37 percent and ranged from a low 29 percent in the MCH (OB/Gyn and pediatrics) ward to 47 percent in the medical ward. The available data for bed occupancy was not very reliable, so it is important that collection of occupied bed statistics become part of the daily routine of the wards.

Table 15: Inpatient Statistics

Cost Center (Wards)	Beds	Discharges	Occupied bed days	Bed occupancy rate	Average length of stay
Inpatient MCH	20	732	1,602	29%	2.2
Inpatient Medical	20	524	2,555	47%	4.9
Inpatient Surgical	20	330	1,965	36%	6.0

When compared with the other two pilot hospitals, Dekemhare tends to have higher unit costs. The bed occupancy rate partly explains the higher cost per day which when compared to Keren Hospital and the Pediatric Hospital.

4. Issues Arising from Cost Analysis

4.1 Hospital Operating Costs

4.1.1 Accounting for Hospital Costs

The hospitals' accounting systems follow the prescribed Eritrean public accounting procedures and are cash-based, i.e., they only record flows of cash payments and receipts; unpaid obligations are not captured as expenses until they are paid. Similarly, goods and services received in-kind are not recorded in the accounting system. However, all goods received are normally recorded in the stores stock control cards whether paid for or not.

4.1.2 Budgetary Allocations

Hospital expenditures are recorded and controlled by budgetary line item. The Ministry of Finance deposits each hospital's budgetary allocations into the hospital's bank account monthly. When the MOF issues an additional allocation for any line item, this may or may not be deposited into the account. If it is an additional allocation for the purchase of drugs and other medical supplies, the funds are deposited into the Central Medical Stores and the hospital draws down on this account according to its needs. Because this money has not gone through the bank account, the hospital finance departments do not account for it; they account only for what has been paid into and out of their bank account. This means that their financial reports are more often than not inaccurate, as they understate the expenditure on drugs and all other items received in kind. The Ministry of Finance does not expect the hospital to report on anything other than what has been paid for from the bank account. In order to correct for this understatement of the hospital reports to the MOF, this study compared the cost of all goods received by the hospitals' pharmacy departments with that reported by the finance departments and adjusted costs accordingly.

4.1.3 Operating Costs

Table 16 gives an overview of the revenues and expenditures of the three hospitals. Expenditures on drugs and medical supplies have been adjusted to reflect the cost of supplies consumed by departments.

The hospitals show a significant potential for user-fee financing of their expenditures. These levels of cost recovery have been achieved despite the fact that there has not been a major emphasis on user fees in the MOH and there exists a liberal system of exempting the poor from user-fees. (The exemption policy is discussed further in section 4.6.)

Table 16: Revenue and Expenditure Statements

Hospital Name	Mekane Hiwet Peds. Hospital		Keren Hospital		Dekemhare Hospital	
	Nakfa (Annual)	%	Nakfa (Annual)	%	Nakfa (9 months)	%
REVENUE (user fees)						
Pharmacy	85,485	7.5%	627,639	67%	158,790	50%
Treatment (all other patient fees)	1,047,947	92.5%	308,674	33%	158,283	50%
Toltal user fee revenue	1,133,432	100%	936,313	100%	317,073	100%
EXPENDITURE						
Salaries	2,732,087	44%	2,246,106	47%	1,078,100	48%
Drugs and medical supplies	2,399,689	38%	1,405,155	30%	713,942	32%
Food services	652,756	11%	438,000	9%	157,553	7%
Electricity and water	128,873	2%	354,630	8%	23,550	1%
Other indirect costs	324,332	5%	295,860	6%	279,400	12%
Total expenditure	6,237,737	100%	4,739,751	100%	2,252,545	100%
Net funding from MoF	(5,104,305)		(3,803,438)		(1,935,472)	
Overall cost recovery	18%		20%		14%	
Cost recovery non-wage expenditure	32%		38%		27%	

The operating costs shown do not include depreciation on fixed assets. In common with most public accounting systems, capital expenditure is written off in the year it is incurred. There are no readily available records of the costs of the assets in use. As stated earlier, the failure to include capital costs in the cost analysis underestimates the cost of providing health care and overstates the degree of cost recovery. The error will be more pronounced in departments that are capital intensive, such as X-ray, which uses expensive equipment, compared to those that use fewer capital items, for example, the outpatient departments. The management development program currently underway is addressing such issues as this to make hospital managers aware of the importance of keeping adequate records of all hospital resources and making use of available financial management information.

4.2 Hospital Performance Indicators

The MOH spends a large portion of its annual budget on hospitals. While there have not been detailed studies on health expenditures in Eritrea, it was estimated that 61 percent of MOH expenditures in 2000 went to hospital-based health care (Fiedler, Hartenberger, and Wiersma 2002). Given this large investment in hospitals, it is important that their performance is closely monitored to make the best use of available resources and maximize the volume and quality of services.

Performance of hospitals can be measured in terms of:

- Volume of patients served. This can be compared across hospitals of similar size or for one hospital over time.
- Cost efficiency of service delivery by comparing the outputs (patient volumes) with cost of resources used.
- Cost recovery for the hospital as a whole and for selected services as an indicator of the level of contribution that patients make towards the care they receive in hospital. The rate also indicates the level of subsidy that the government is giving patients – if average cost recovery is 20 percent, the government is giving an 80 percent subsidy on average.
- Utilization of staff and other resources such as hospital beds and equipment. For example, the volume of patients served compared to the available staff numbers/hours gives an indication of how well staff are utilized in the hospital. The bed occupancy rate shows the utilization of hospital beds. These indicators can also be compared to national quality of care standards to gauge quality of care at the hospital.

A table of hospital performance indicators is given in Annex A. It provides examples of indicators that could easily be used in Eritrea. Many of these have already been discussed in the report. At present, in Eritrea, there are no national guidelines on quality of hospital-based care. Hospital management teams are already being trained to use some of these indicators and a major review of the National Health Management Information Systems is expected in 2004 to make the system more appropriate and responsive to health managers' information needs.

4.3 Capacity Utilization

The operating costs in Table 16 above can only be properly appreciated in the context of what output the expenditure helped to achieve. Common measures of hospital workload include outpatient visits and inpatient admissions, discharges, and bed days. In order to arrive at a single measure of patient volume, the outpatient visits are sometimes converted to patient days by using a factor that reflects the relative use of resources between an outpatient visit and an inpatient day. This is done in Table 17 by comparing the costs per visit and per day and dividing the outpatient visits by that number to arrive at patient day equivalents. The factors used are: Pediatric Hospital 2.0, Keren 1.5, Dekemhare 2.5 outpatient visits are equivalent to one inpatient day.

The Pediatric Hospital has higher bed occupancy than the other two, suggesting that it has better capacity utilization. Dekemhare used to be a health center and was upgraded (with new buildings and additional staff and equipment) to a community hospital just over two years ago. (See further discussion of occupancy rates in section 4.4.)

Staffing levels at the three hospitals, however, also show the Pediatric Hospital making fuller use of its staff.

The full utilization of available capacity in the hospital will contribute to lower unit costs. There are other factors that also impact on the unit costs, including quality of care and efficiency in the use of other resources, especially those that are expended on a daily basis, e.g., food and drugs. These will be considered further below.

Table 17: Capacity Utilization

	Pediatric Hospital	Keren Hospital	Dekemhare Hospital
Outpatient visits	30,830	36,402	16,337
Inpatient bed days	54,788	46,216	6,122
Total patient days	60,954	53,496	9,389
Bed occupancy rate	79%	70%	37%
No. of doctors	11	12	4
No. of nurses	74	81	34
Patient days/doctor	5,541	4,458	2,347
Patient days/nurse	824	660	276
Total operating costs	6,237,737	4,739,751	2,252,545
Cost per patient day	102	89	240

4.4 Cost Efficiency

The costing results reveal wide variation of unit cost between the community hospital and the larger regional and national referral hospitals. Differences in unit costs are partly due to the volume of services as mentioned above, as higher volumes allow fixed costs to be spread over many units thus reducing the cost per unit. Efficiency in the use of resources and the quality of health care can also have a major impact on unit costs. This study did not consider any aspects of quality of care, as this was outside the scope of the study; other studies have shown evidence of improper prescribing patterns among doctors in Eritrea as well as other quality shortcomings that would have a negative impact on costs (Quality Assurance Project 2002).

Table 18 provides more detail of the differences in unit costs in the three hospitals.

The high costs per unit in Dekemhare can be partly explained by the low volume of patients compared to the fixed costs of staff in the hospital. In other words, it appears that the hospital is too large for the immediate needs in Dekemhare.

Table 18: Unit Cost Comparisons

Cost Type	Pediatric Hospital		Keren Hospital		Dekemhare Hospital	
	Outpatient	Inpatient	Outpatient	Inpatient	Outpatient	Inpatient
Variable costs per unit (drugs, food, etc.)	19.5	44.2	19.7	24.4	34.5	50.4
Fixed costs per unit (salaries, etc.)	27.0	47.1	24.9	43.0	37.0	126.6
Total	46.6	91.3	44.6	67.4	71.5	177.0

Dekemhare is one of the first health centers to be upgraded to a community hospital as part of the MOH's drive to increase the available number of hospital beds in the country. Its low utilization rate should encourage the Ministry reason to think through any further upgrades of health centers to hospital level. On the other hand, while future health care needs have not been clearly estimated, it is likely that utilization will increase in the near future with the demobilization of soldiers and the impact that is likely to have on population growth and disease profiles; for example, there is concern that the incidence of HIV infections will increase, and this will produce demand for more hospital beds. However, no clear analysis has been done to investigate this and give guidance to the Ministry.

The Pediatric Hospital has the best capacity utilization of the three hospitals. Its unit costs are, however, higher than those of Keren Hospital. Some possible reasons for this include:

- Although the number of staff is higher in Keren, the cost of staff is about 22 percent higher in the Pediatric Hospital. The Pediatric Hospital is in the capital city, Asmara, and employs more clinical specialists and better-qualified administrative staff than Keren, a regional capital.

- The major variable costs, drugs/supplies and food, are much higher in the Pediatric Hospital than in Keren. Food is 49 percent and drugs are 70 percent higher. Such differences are significant enough to warrant further investigation. Reasons for the differences may include:

  - The patient mix. The nutrition offered to children at the Pediatric Hospital may be more expensive than what would normally be offered to older patients.
  - Differences in drugs requirements. Coupled with this is the observed wastage of some drugs that are dispensed by the pharmacy in units that are too large for the dosages required by children, leading to waste if the drug cannot be shared among patients or safely stored once opened. This is an issue that has been highlighted by the head of Pharmacy at the Pediatric Hospital.
  - Poor controls over the prescribing and use of drugs. The hospital's internal controls over drugs are very weak. The Ministry is working on new procedures to help monitor the consumption of drugs at all hospitals and to improve controls over waste.

4.5 User-fee Revenue

Hospital user-fee revenues are primarily generated from the sale of drugs (Table 19). The MOH policy is that drugs should be sold at purchase cost. The hospitals are not allowed to load any of the costs of transport or storage. Registration fees covers all other fees including inpatient bed charges, laboratory, x-ray, outpatient registration, surgery, etc.

Data on fee revenues was obtained from the reports submitted by the hospitals to the Ministry of Finance. There was insufficient data to be able to do much analysis on the reported revenue as there was no separation between the origins of the revenue, i.e., whether inpatient or outpatient.

Table 19: User-fee Revenue

	Pediatric Hospital		Keren Hospital		Dekemhare Hospital	
	Nakfa (Annual)	%	Nakfa (Annual)	%	Nakfa (9 months)	%
Pharmacy (sale of drugs)	85,485	7.5%	627,639	67%	158,790	50%
Treatment (all other patient fees)	1,047,947	92.5%	308,674	33%	158,283	50%
Total	1,133,432	100%	936,313	100%	317,073	100%

The fees from sale of drugs in the Pediatric Hospital are much lower compared to the other two hospitals. This was due to errors in separation of the two sources of patient fees as well as the fact that fee-paying outpatients are required to purchase their drugs from outside pharmacies; the hospital outpatient pharmacy only serves those with the Poverty Certificate (see below) and those who are being treated on credit, usually staff of other ministries.

4.6 Exemption Policy

There exists an exemption policy to allow the poor and other specified categories of patients to receive health services at no charge. The following categories of patient and conditions are included:

- The poor, who have to produce a "Poverty Certificate" issued by the Ministry of Local Government. The hospitals have no control over the issuing of these certificates, and some fraudulent use has been suspected. Currently, the revenue lost to this exemption is over 20 percent in Keren Hospital, which has been keeping records to monitor the volume of exemptions.

- Emergency cases. These are treated in the outpatient department and may be admitted in the emergency ward for 24 hours. They are required to pay only if they are admitted into the normal wards.

- Certain disease conditions that are considered "hazardous and contagious to the public" (MOH 1998), (e.g., tuberculosis; leprosy; HIV/AIDS; explosive injuries; mental illness) and preventive and promotive health care (e.g., immunizations; well baby and antenatal clinics).

4.7 Hospital Management Information

The information systems of the pilot hospitals are typical of other MOH hospitals. Most of the data that is collected is used to prepare reports for external (MOH or MOF) consumption. It appears that little of the information gets used by management in decision making. In discussions with members of the hospital management teams, it was clear that there has not been much demand for information and therefore the heads of departments have not needed to produce any more than the minimum amount of information to satisfy Ministry requirements. This situation is now changing as the teams are trained in various aspects of hospital management. In Keren Hospital, for example, revenue data and cost of drugs and medical supplies are being produced routinely.

The development of a culture of information use will take effort on the part of the hospital managers as well as the MOH head office.

4.7.1 Workload Data

Workload data is collected regularly and submitted to SEMISH on a monthly basis. No feedback is received from SEMISH and it is unclear who makes use of this data. The matrons also collect data for their own use to monitor activities and to advice the administrator and kitchen; these data are not formalized and reported in a structured manner within the hospitals.

In Dekemhare, data that should be routinely available were either not available or contained errors. For example, the wards did not accurately report data on inpatient volumes. The outpatient emergency data had not been summarized from the patient registers. Incorrect or incomplete data will almost certainly lead to wrong decisions. For example, wrong inpatient data will lead to wrong decisions on how much food to prepare for patients.

4.7.2 Finance Departments

The accounting system in use does not accurately capture all recurrent costs, particularly drugs and medical supplies. In order for the finance departments to be a useful source of information to management, it is important that all costs are accounted for. The finance departments submit monthly reports to the Ministry of Finance; these reports, however, are not sufficient to meet the needs of the hospital management. The PHR*plus* project is addressing this area in the ongoing technical assistance on hospital reforms.

The following information should be routinely available to hospital management:

- Revenues generated by each department. This can be shown side-by-side with the volume of services delivered by that department. Such a report would provide management with an extra level of internal control over revenue, as they would be able to check quickly whether the reported revenue looks reasonable in the light of the volume of activity.

- Cost of drugs received in the hospital. This will involve collaboration between the hospital pharmacy and the finance department. The pharmacy has fuller information than the finance department on what has been purchased. A monthly report on cost of drugs issued to departments would provide valuable information on the use of drugs, especially when viewed against the volume of patients.

4.8 Drugs and Medical Supplies

As mentioned above, data on the use of drugs and medical supplies by each department were not readily available at any of the hospitals. This is the second most important cost items in the hospital after staff costs. It is important therefore that a system is developed that can adequately track the issue of medical supplies from the pharmacy to the user departments, especially the wards. Similarly, it is important to establish systems within the user departments themselves to ensure that, where possible, there is a link to patient records.

Drug costs per patient day (see Table 20) display such variation that more work is needed to verify the reasons. While case mix will play a role in this variation, it does not explain why the smallest hospital uses nearly twice more drugs per patient day than the national referral hospital and three times more than the regional hospital. The poor recording of drugs issued to user departments may partly explain this anomaly, as the figure could well include some medical equipment.

Table 20: Drug Costs per Patient Day

	Pediatric Hospital	Keren Hospital	Dekemhare Hospital
Total cost of drugs	2,399,689	1,405,155	713,942
No. of patient days	60,954	53,496	9,389
Drug cost per patient day	39.4	26.3	76.0

Keren Hospital is the only one among the three that has established a system to help monitor the consumption of drugs in the wards. Each patient file includes a form for tracking the drugs prescribed to make sure they have been correctly given to the patient. The ordering of drugs by the head nurse for each ward is based on the consumption/prescriptions shown on this form. Although this is not yet linked to any other records of drugs, the hospital management believes that it has served as a deterrent to the misuse of drugs.

4.9 Uses and Limitations of Unit Costs

4.9.1 Uses of Unit Costs

The hospitals can make use of this cost analysis in the following important areas:

- Budgeting: as hospitals prepare their budgets they will be able to use the new information to make better estimates of their funding needs. This information should also be used to negotiate more reasonable budget allocations with the MOH and MOF. The unit costs give a good indication of the total cost of resources required to produce one unit of output in each department. Projected service volumes coupled with unit costs can be used to set budgets for each department and for the hospital as a whole.

- Unit costs can be useful in decisions on setting of fee levels. Fees should relate to the underlying costs of providing services and any subsidies should be clearly monitored. The fees in use now have no clear relationship to the cost of providing services.

- Efficiency in the provision of services can be monitored by comparing the unit costs of different departments over a period of time. Comparisons can also be made with other hospitals.

- The process of analyzing costs by department is a good exercise in the creation of cost centers. Cost centers help the hospital to begin to place responsibility for costs and revenues on the heads (managers) of each cost center. This is a major step towards improving a hospital's cost efficiency

- Setting standard costs of care: unit costs as calculated in this exercise can be adjusted for any deficiencies in resources and quality of health care to generate standard costs. These standard costs would be useful for assessing hospital cost efficiency, as hospitals can be held to specific costs per unit of care. Hospitals that show higher costs would be investigated to find out why their costs are higher than the standard. Cost consciousness in hospital-based health care is a critical ingredient in the process of improving allocation of resources to make more available for primary health care.

- Cost Control: hospital management teams should look at each area of the hospital and the unit costs associated with outputs and ask themselves why the costs are at the level that they are: is it possible to produce services more cost efficiently?

- Planning: the MOH should begin to get a picture of what it costs, at current levels of quality, to provide hospital-based care. This information should feed into the planning of resource allocations to hospitals, after adjustment for any obvious inefficiency.

4.9.2 Limitations of Unit Costs

Unit costs should always be used with caution, bearing in mid the following:

- The usefulness of unit costs depends largely on the validity of the underlying data. There are still some issues with respect to the allocation of medical supplies that need to be addressed by the hospitals. Given that drugs and other supplies are such an important item of expenditure, it is important that there are systems in place to monitor the use of these resources on a routine basis.

- Unit costs are average costs and as such should be used with care, particularly when making pricing decisions. For example, the unit cost per discharge can be compared with the average revenue received from patients discharged during the same time period to provide information on the cost recovery performance of a cost center. However, if a decision is to be made on specific services, it may be necessary to conduct additional analysis to figure out the exact costs involved in the provision of a specific service.

- Cost results are not sufficient in themselves allow for making conclusive judgments about the operations of the hospitals; quality of care being delivered at each hospital must also be known. These results should be interpreted with care and, where possible, linked to the quality assurance work that is also going on at these hospitals.

- In making comparisons between hospitals, issues that need to be taken into account include:

    - Volume of patients and differences in case mix and complexity. Referral hospitals may tend to receive sicker patients who have been referred from lower levels of the health system.
    - Location of hospitals and differentials in the prices of key inputs, especially drugs and staff.

Annex A: Hospital Performance Indicators

Indicator	Calculation	Description	Purpose of the Indicator
Revenue Generation			
Net price per discharge	= Net inpatient revenue / Total discharges	Compares the net revenue received from inpatients and outpatients to the volume of patients. Net fees are the gross patient fees less free care, e.g., "Poverty certificates." The indicator is influenced by fee levels, collection efficiency, level of free care.	Revenue collection efficiency Revenue potential?
Net price per visit	= Net outpatient revenue / Total outpatient visits		
Poverty/exemption percentage	= Rev. lost to exemptions / Gross patient revenue	The value of revenue that is lost to "Poverty Certificates" and other exemptions as a percentage of total (gross) revenue, i.e. cash received + exemptions.	How much free care is costing the hospital in terms of lost revenue
Inpatient revenue %	= Net inpatient revenue / Total net revenue	Percentage of total revenue received from inpatients, outpatients and other sources (e.g. hire of facilities).	Shows managers what areas are generating the most revenue. Trends over time can reveal revenue collection inefficiency and losses. Directs management attention to the most important revenue centers.
Outpatient revenue %	= Net outpatient revenue / Total net revenue		
Other revenue %	= Other net revenue / Total revenue		
Efficiency/Capacity Utilization			
Full-time equivalent number of staff (FTEs) per occupied bed	= Inpatient FTE staff / Average daily census	The average number of staff working in the wards compared to the average daily number of patients. A high ratio may indicate underutilization of staff	Compared to established standards, shows level of utilization of staff (fixed costs). Lower utilization leads to higher unit costs. Can be compared to standards of inpatient coverage to assess quality of care.
Outpatient labor hours per visit	= Outpatient FTE's x hrs worked / Total outpatient visits	The total available staff time in OPD divided by the number of outpatient visits/patient days/discharges, etc. Total time = No. of FTE staff x productive hours per year (i.e. excluding vacations, holidays, etc).	Measures quality of care as well as staff utilization. Useful in negotiating staffing needs with Ministry.
Inpatient labor hour per discharge	= Inpatient FTE's x hrs worked / Total discharges		
Inpatient labor hour per patient day	= Inpatient FTE's x hrs worked / Total patient days		

Indicator	Calculation	Description	Purpose of the Indicator
Outpatient visits per FTE doctor, nurse, etc.	= Total outpatient visits / Outpatient FTE doctors, nurses, etc.	This indicator is similar to the one above and measures the utilization of staff in different hospital areas. Can be applied to a single department or to the whole hospital.	
Inpatient days per FTE doctor, nurse, etc.	= Total patient days / Inpatient FTE Doctors, nurses, etc.		
Bed occupancy rate	= Patient days x 100 / 365 x official no. of beds	Calculates the average bed occupancy rate. Bed occupancy rate is based on the official number of beds only.	Shows the level of utilization of the official bed capacity. An average bed occupancy rate of 80–85% is considered ideal to ensure good quality care while making best use of the available capacity.
Average daily census	= Patient days / 365	Shows the average volume of inpatients.	Useful for planning the hotel services of the hospital (catering, laundry) and staffing.
Average length of stay (ALOS)	= Patient days / Total discharges	ALOS shows how long the hospital is keeping patients before they are discharged.	Shows efficiency of hospital in providing inpatient care. An increasing ALOS may indicate changes in case mix, or declining quality of care.
Cost Efficiency			
Cost per discharge	= Total inpatient costs / Total discharges	These unit costs demonstrate the hospital's ability to deliver health services cost effectively.	Unit costs can be compared to net revenues for a service or for the whole hospital to obtain the cost recovery rate. Can be used in setting of fee levels.
Cost per visit	= Total outpatient expenses / Total outpatient visits		
Cost per patient day	= Total inpatient costs / Total inpatient days		
Profitability			
Cost recovery rate	= Net revenue for service / Total costs for service	The cost recovery rate shows the ability of the hospital to pay for its operations through user fees. The rate can be calculated for a single service, or department, or the whole hospital. It shows the level of subsidy patients are receiving from the government when they receive care from the hospital.	Shows ability of patients to pay for hospital services. Indicator of "profitability" of different services.

Annex B. Reference List

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