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Costs of Maternal Health Care Services in Blantyre District, Malawi

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Reform
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Abstract

This study by the Partnerships for Health Reform and the University of Malawi Centre for Social Research evaluates provider and consumer costs of six maternal health services, along with selected quality indicators, at four health facilities (one public and one mission hospital, one public and one mission health center) and among traditional birth attendants in Blantyre District of Malawi. The study examines costs of providing the services in order to examine the reasons behind cost differences, assess the efficiency of service delivery, and determine whether management improvements might achieve cost savings without lowering service quality. Costs that consumers pay to obtain maternal health services are also determined, along with the percentage of total costs recovered by providers from fees for services.

The study finds that routine maternal health services in the facilities cost less than $6 for antenatal care and less than $24 for vaginal delivery. Obstetrical complications are more costly, ranging from $30 for treatment of post-abortion complications at the mission hospital to $107 for treatment of eclampsia at the public hospital. The most costly input is materials, which comprise more than three-quarters of direct costs.

The costs differ between hospitals and health centers as well as among mission and public facilities. As in other African countries, hospital costs are higher than health center costs, but, unlike those countries, costs at the central public hospital exceed those at the mission hospital. The differentials are explained through differences in the role of the facility, use and availability of materials and equipment, number and level of personnel delivering services, and utilization levels of services.

The report concludes with several recommendations for cost savings, of particular importance to a country like Malawi with its high utilization of maternal health services but limited resources.

Table of Contents

List of Tables

List of Figures

Acronyms

ANC	Antenatal Care
CHAM	Christian Hospital Association of Malawi
CSR	Centre for Social Research
MOHP	Ministry of Health and Population
MK	Malawian Kwacha
NGO	Non-governmental Organization
PHR	Partnerships for Health Reform
TBA	Traditional Birth Attendant
USAID	United States Agency for International Development

Exchange Rate

Malawian kwacha 26 = US$ 1.00 at the time of the study.

Acknowledgments

This study is part of a three-country effort supported by the Africa Bureau of the United States Agency for International Development (USAID) and coordinated by Partnerships for Health Reform (PHR) to compare costs of maternal health services in Ghana, Malawi, and Uganda. The study was conducted in Malawi by the University of Malawi Centre for Social Research. Discussions with the Ministry of Health and Population, as well as with USAID and MotherCare Project representatives in Malawi, informed the focus and design of the study.

Implementation of the cost study in Malawi would not have been possible without the hard work and dedication of the study team's data collectors and observers. In addition, the authors would like to thank all the hospital and health center staff, traditional birth attendants, and clients who participated in and contributed to the study.

The authors are grateful for the valuable comments of Dr. Charlotte Leighton of PHR and Dr. Ronald Mataya of MotherCare. They also would like to thank Vita Tanzi for calculating the drug costs and Courtney Barnett and Leanne Dougherty of the PHR Special Initiatives program for assistance with data cleaning and analysis.

Executive Summary

Introduction

This study evaluates provider and consumer costs, along with selected quality indicators, for six maternal health services provided at public and private hospitals and health centers and by community practitioners in Malawi. The study examines costs of providing the services in order to learn the reasons behind cost differences, assess the efficiency of service delivery, and determine whether management improvements might achieve cost savings without hurting quality. This assessment is important to Malawi and other African countries with ambitious goals for improving maternal health but scarce public health resources and limited government budgets.

The study also evaluates the costs that consumers pay to use the maternal health services, along with the contribution that revenues from fees for services make to recovering health facility costs.

Methodology

The Partnerships for Health Reform (PHR) conducted this study in collaboration with the University of Malawi Centre for Social Research (CSR). The PHR–CSR team collected data on the costs of delivering six maternal health services—antenatal care, normal deliveries, cesarean deliveries, post-abortion care, postpartum hemorrhage complications, and eclampsia complications—in June–August 1998 at a public and a mission hospital, at a public and a mission health center, and by 20 traditional birth attendants (TBAs) in Blantyre District of Malawi. The field team collected data during one week at each of the four health facilities and spent two other weeks collecting data from TBAs.

The field team collected data on total operating costs (e.g., personnel, drugs, supplies, material, utilities, overhead expenses) directly associated with providing the maternal health services (direct costs), as well as related support costs (indirect costs). For a variety of reasons, the study does not include capital and investment costs. It does include several measures of structural quality and some measures of process aspects of quality. Data collection techniques included personnel observation studies to obtain data on time allocation of personnel, facility quality checklists, provider interviews to determine lines of treatments and time use, facility record reviews, and client exit interviews on expenditures and client satisfaction.

The Ministry of Health and Population (MOHP) and PHR–CSR team jointly planned the field study and selected the study sites. The public and private health facilities included in the sample are among the best in Malawi. While data from these four well-stocked facilities are thus not representative of public or of private facilities in Malawi, the rationale for their selection was that there is little point in costing poor-quality services.[1] Therefore, the data and conclusions from this analysis are best understood as case studies of four health facilities and of a small sample of independent community practitioners. The case study data can, however, be used to illustrate

[1] However, it should be noted that being well-stocked is not equivalent to being high-quality.

financing and efficiency issues that the MOHP could address in its efforts to strengthen maternal health services in Blantyre and elsewhere in the country.

Results

Provider Costs

Estimated total (direct plus indirect) unit operating costs of routine maternal health services in the four health facilities in Blantyre District ranged from $3.00 to $4.25 in health centers and $5.00 to $6.00 in hospitals for antenatal care and from $10.00 to $11.25 in health centers and $11.00 to $24.00 for delivery services. Costs were higher for obstetrical complications and ranged from $30.00 for treatment of post-abortion complications at the mission hospital to $107 for treatment of eclampsia at the public hospital.

The results of the unit cost analysis at the four facilities indicate that material (drugs and supplies) costs were high compared to other costs and accounted for three-quarters of direct costs. The costs of labor, on the other hand, were relatively small because of low personnel salaries and high service volumes at the facilities. Indirect costs were substantial for all services other than antenatal care and constituted from 21 percent to 62 percent of total unit costs.

As expected, total costs per service were generally highest at hospitals, reflecting greater use of drugs and higher employment of skilled personnel.

The costs at the public hospital were higher than at the mission hospital due to use of more highly skilled personnel; to some extent, to more drugs; and to more support personnel. This finding differs from other countries where the costs at mission hospitals are often higher. These costs may be attributable to the fact that resources are concentrated at the public hospital because it is associated with the University of Malawi College of Medicine. In addition, because it is a referral hospital, its case mix is more varied and includes a higher proportion of complicated cases than does the mission hospital. On the other hand, it should be understood that its heavier use of personnel and drugs may reflect poor management of scarce resources rather than better quality.

Despite its relatively generous share of resources, the clinical staffing at the public hospital was inadequate to provide the high volume of routine services. This problem is unusual for hospitals in African countries, where overstaffing is more common, and is probably related to the unusually high utilization of maternal health services in Malawi.

Unit costs per service given by TBAs were relatively low since only a few drugs and supplies were used, and averaged $0.89 per antenatal service and $1.92 per delivery service. The cost of the services, particularly those of drugs and supplies, are subsidized by the MOHP.

Provider Efficiency

In order to measure efficiencies in the delivery of services at the facilities, two assessments were conducted. First, the staff to client ratio for deliveries was examined. If the standard is that a nurse/midwife should be able to provide approximately 1,000 antenatal cases per year and attend 150–200 deliveries per year in a hospital setting, then the public hospital and possibly the mission hospital are understaffed. The midwives at the health centers conduct fewer deliveries but are probably staffed adequately since they require replacement personnel at night and during holidays.

The second assessment was to estimate the percentage of time that the personnel spent on downtime. Excluding ward attendants, the personnel at the busy public hospital spent the least amount of their time (5–16 percent) of their time on downtime; personnel at the mission hospital spent slightly more of their time unoccupied (13–19 percent). Health center employees were more likely to be involved in non-work activities: they were unoccupied 10–28 percent and 23–57 percent at the public and mission health centers, respectively.

Provider Quality

No patterns among public and private facilities were found in the relationship between costs and service quality indicators. Despite the fact that the public hospital had higher costs and used more drugs and support personnel, the mission hospital scored better on process quality indicators and client satisfaction. This is probably attributable to a smaller client volume to staff ratio and possibly better management of drugs and personnel. The public health center, while having lower costs than those at the mission health center, scored better on process quality, possibly due to its more highly skilled personnel and better management.

Client Costs

According to client exit interviews at the four health facilities, total costs paid by clients ranged from $0.14 at the public health center to $8.71 at the public hospital for an antenatal care visit, from $0.35 (public health center) to $7.69 (public hospital) for a vaginal delivery, and from $1.88 (mission hospital) to $7.78 (public hospital) for an obstetrical complication.

Travel fees are often a prominent part of costs paid by the patient. In this study, they were reported to range from $0.12 to $1.13 for antenatal care visits and from $0.19 to $2.37 for delivery services.

Cost Recovery

The percentage of operating costs recovered through user fees was highest for paying clients at the public hospital, where fees ranged from 133 percent for antenatal care services to 36 percent for obstetrical complications. At the mission facilities, cost recovery rates were less than 25 percent in most cases, and did not appear to be set systematically.

Since the users of the paying wards at the public hospital are self-selected, the providers do not have to be concerned with the ability to pay of these clients. However, without more information on the percentage of clients who are paying vs. nonpaying, it is not possible to determine the effect of this mechanism on overall cost recovery at the hospital.

Recommendations

- *Clients should be encouraged to use health centers rather than hospitals when they only require routine services.*

Since costs for routine services were lower and service quality was generally acceptable at the health centers, clients should be encouraged to obtain services there. This would allow hospital personnel to be reserved for complicated cases and would lower the client volume to staff ratio. This recommendation complements the assessment of the *Malawi Health Expenditure Review* (World

Bank 1999) that budget allocations to central hospitals in Malawi are too high and should be lowered in favor of rural facilities. However, while central hospitals are overused, it will be difficult to shift funding.

The Ministry of Health and Population should introduce incentives for the use of secondary rather than tertiary facilities. These include: (1) the introduction of a fee structure that charges higher fees at hospitals than at health centers for routine services; (2) promotion of the benefits, such as less crowding, of using health centers, and (3) improving service quality at health centers.

- *Service quality at facilities needs to be improved through the introduction and monitoring of standard protocols for service delivery.*

The study indicated that some standard procedures were not being followed for antenatal care and vaginal delivery. For example, important procedures for the treatment of newborns were not taking place. To encourage the use of standard protocols, checklists should be developed to help supervisors ensure that these procedures are implemented.

- *Facilities should consider setting goals of cost recovery for maternal health services.*

The analysis of unit costs and percentage of costs that are recovered from user fees indicates that cost recovery is low, except for paying clients in the public hospital, and varies for different services. A more systematic method of price setting would assist facilities to reach their goals of financial sustainability. A facility may decide, for example, that at a minimum, it wants to recover a certain percentage of the costs of drugs for a given service; fees can then be set to achieve this goal.

- *Before introducing or increasing user fees, the public sector should assess the population's willingness and ability to pay, to prevent decreasing utilization of services.*

It is important to determine whether the population could continue to utilize maternal health services if fees were introduced or increased. This is important both in terms of evaluating the impact of higher fees on clients' overall demand for services and their choice between public and private providers. In addition, if fees are introduced at hospitals, it will be important to introduce exemptions for lower-income clients who need to be treated for obstetrical complications.

Another factor that needs to be researched before setting fees for maternal health services is the relative importance of consumer costs on the decision to seek emergency health services and the extent to which fees are a barrier to use of these services. While emergency maternal health care services are costly to provide, high fees could deter use. Information on the determinants of emergency service use and the relative importance of fees could be used by facility managers/administrators in considering rates of cross-subsidization for emergency services from other ones.

- *Managers should review and find ways to reduce the time that staff, particularly ward attendants, spend unoccupied (on downtime).*

- *Additional research issues should be investigated.*

Researchers should investigate issues such as (1) evaluate the success of having wards with higher prices in public hospitals; (2) conduct a more thorough assessment of service quality; and (3) assess whether drugs are overprescribed in these facilities, to gain a fuller picture of drug use.

1. Introduction

1.1 Overview

This study is part of a three-country effort supported by the United States Agency for International Development (USAID) and coordinated by the Partnerships for Health Reform (PHR) to compare costs of maternal health services in Ghana, Malawi, and Uganda. The study was conducted in Malawi by the University of Malawi Centre for Social Research (CSR). It aims to provide information to effect policy and program reforms towards optimal provision and utilization of maternal health services.

In order to contribute to the USAID Population, Health and Nutrition Center's strategic objective to reduce adverse health outcomes to women as a result of pregnancy, PHR has a Maternal and Reproductive Health Special Initiative to improve the management and sustainability of maternal and reproductive health programs. The three-country study came as part of a request from the USAID Africa Bureau and is concurrent with a more qualitative assessment of safe motherhood interventions in Ghana, Malawi, and Uganda carried out by the USAID-sponsored MotherCare Project. This paper focuses on the results of the costing study PHR and CSR conducted in one district of Malawi.

1.2 Study Objectives

The main objective of the study was to estimate costs of providing key maternal health services and to compare differences among facility levels, including community providers, as well as between public and private (mission) providers in one district of Malawi. A second objective was to estimate the cost to consumers of attaining these maternal health services.

2. Background

Malawi is located in southern Africa and has a population of approximately 10 million and a population growth rate of 3 percent. The majority of the population (86 percent) lives in rural areas. The national literacy rate is 72 percent for men and 42 percent for women. The economy has deteriorated in the 1990s due to severe droughts that caused massive crop failure in 1991/92 and 1993/94 and to some of the fiscal policies of Malawi's new democratic government. The per capita GNP in 1997 was $220 with an average annual growth rate of 3.1 percent.

While improving, the health status of the country is relatively low. The infant mortality rate is 133 deaths per thousand births, under-five mortality is 217 deaths per thousand births, and life expectancy at birth is 43 years. The maternal mortality ratio is estimated to be 620 per 100,000 live births per year over the period 1990–96 (World Bank 1998). Contributing factors to maternal mortality are the high fertility rate (6.7 children per woman) and high rates of sexually transmitted diseases, including HIV/AIDS.

Malawi's economic situation is still fragile, and the government is committed to alleviating poverty in the 1990s. Resources have been shifted to social sectors and attention is being given to ensure that these resources are used more effectively and efficiently, especially in rural areas and among vulnerable populations. Health priorities focus on diverting resources from expensive urban hospitals in order to increase expenditures for low-cost rural health centers. The government of Malawi is also committed to increasing family planning activities to manage rapid population growth.

Public-sector health services in Malawi are provided by a five-tiered system that includes community-level facilities, health centers, district hospitals, central hospitals, and special hospitals. Like other African countries, government policies stress the provision of primary and preventive health care, yet patterns of health care spending tend to favor hospital-based curative care. Seventy-five percent of service-delivery staff works in central and district hospitals. Public-sector facilities are generally understaffed and effective care is further undermined by limited supplies and equipment. Although recent health budgets have reduced the percentage of the budget going toward central hospitals, they often tend to overspend their allocations while district hospitals underspend.

The majority of modern health care services in Malawi are provided by the Ministry of Health and Population (MOHP) and subsidized private facilities run by the Christian Hospital Association of Malawi (CHAM). In 1991, the MOHP provided roughly 60 percent of health services, while CHAM provided 30 percent (Cripps et al. 1998). Traditional practitioners provide health services to rural populations, and a limited number of private for-profit providers serve urban areas.

The majority of the population has some access to services and service use is widespread for maternal health care. According to UNICEF, about 80 percent of Malawi's population lived within one hour's traveling time to a health facility between 1985–95. Use of basic health services is high with 90 percent of women using antenatal care and 54 percent of births attended by a trained attendant, i.e., nurse, midwife, or doctor. Another 18 percent of births were attended by traditional birth attendants (TBAs). The remaining births were either assisted by a friend or relative (21 percent) or were unattended (5 percent) (National Statistical Office 1992).

2.1 Health Care Financing

The World Bank's *Malawi Health Expenditure Review* (1999) estimates that Malawi spent US$93 million[2] on health in 1997/8, roughly 2.3 percent of GDP (1991–95) and $7.82 per capita during fiscal 1997/8. Public financing for health care in Malawi in 1990 amounted to 35 percent of total health care financing. Private financing amounted to 42 percent of total health care financing, while official foreign aid comprised the remaining 23 percent (World Bank 1999).

CHAM is the largest non-governmental provider of private funds for health. In 1995, CHAM accounted for 12 percent of total health expenditures and provided around 25 percent of health services. Provision has increased in recent years to between 30 percent and 40 percent of facility-based health care. Despite charging fees, CHAM facilities are heavily reliant on MOHP subsidies for personnel, training, and operating expenses and may more accurately be seen as an extension of the public sector, even though the MOHP has limited administrative authority over CHAM facilities. The MOHP is currently working to better integrate CHAM facilities into ministry strategies.

A very small private for-profit health sector exists in Malawi and includes health care insurers such as the Medical Aid Society of Malawi and some company-sponsored schemes.

During the past decade, Malawi has examined a variety of health reform options, including cost recovery, decentralization, and giving the two central hospitals more autonomy. Sector-wide reform efforts have been limited, however, by continuing economic constraints, changes in the political system, and a lack of political will. Currently, both preventive and curative services technically are provided free of charge in public-sector facilities, although Malawians typically do pay something to obtain services. Public hospitals are now authorized to charge for private wards, fee-based outpatient departments, and specialist services. CHAM facilities charge user fees for curative care, including drugs, consultations, and laboratory services. CHAM facilities retain their user fee revenue and therefore have an incentive to ensure collection. A recent study (Franco et al. 1995) showed that people in Malawi are willing to pay for health services provided the payment is linked to an improved service. The most common improvement mentioned was the availability of drugs. Despite this observed willingness to pay, policymakers are reluctant to support a policy they think will prove unpopular.

2.2 Safe Motherhood in Malawi

A Maternal and Child Health Programme was launched in 1974. Since then, the government of Malawi and its partner non-governmental organizations (NGOs) have been providing maternal health services, including antenatal care (and immunization against tetanus), supervised delivery services, perinatal and postnatal care, and emergency obstetric care. In addition, health providers offer health and nutrition education to mothers, including promotion and protection of breastfeeding. Family planning services were added to this portfolio in 1982. Emphasis on family planning and child immunization, which redirected substantial donor assistance, eclipsed the provision of maternal health care services in the 1980s. However, the Safe Motherhood Conference in Nairobi in 1987 increased interest in maternal health and solidified a base of support for safe motherhood activities in Malawi. The MOHP developed plans for a Safe Motherhood Initiative in 1993, then conducted a needs assessment and developed a national strategic plan for safe motherhood in 1995. The Initiative was officially launched in 1996.

[2] This report gives costs in U.S. dollars except where Malawian kwacha are noted.

In preparing for developing the strategic plan for the Initiative, the MOHP conducted studies to identify the major causes of maternal mortality. These causes include: hemorrhage, puerperal infection, prolonged or obstructed labor including rupture of the uterus, complications of incomplete abortion, and pregnancy-induced hypertension. The safe motherhood needs assessment concluded that most health facilities in Malawi were providing substandard care to meet the needs of women who develop complications during pregnancy, labor, delivery, and puerperium. The major factors contributing to poor quality are inadequate numbers of health personnel; low level of skills among midwifery personnel; poor health infrastructure; lack of transport and communication system for emergency referral; poor attitude of health workers; inadequate essential drugs, equipment, and supplies; absence of treatment guidelines; and inadequate monitoring and supervision of midwifery and TBA services.

The national strategic plan was drafted by a Safe Motherhood Task Force. The goal stated in the plan was to reduce Malawi's maternal mortality by half, from 620 to 310 deaths per 100,000 live births by the year 2001. Objectives of the plan included:

- Creating awareness among the general public of the problem of high maternal mortality and the needs of pregnant women;
- Generating political, government, and donor commitment for financing safe motherhood interventions;
- Reducing delay in obtaining emergency obstetric care;
- Improving the quality of maternal health care; and
- Reducing the number of high-risk pregnancies through family planning.

The Safe Motherhood Initiative has made significant progress, despite limited funding. Advocacy meetings with key stakeholders in maternal health and community decision makers, as well as drama groups, have helped create awareness and encourage involvement of communities in safe motherhood. Several districts have implemented bicycle ambulances, radio communication systems, and maternity waiting homes to reduce delays in obtaining emergency obstetric care services. To improve the quality of care and skills of health workers, the MOHP has provided training to registered and enrolled nurses and midwives in life-saving skills. Following a 1995 amendment to the Nurses and Midwives Act of 1966 designed to ensure that services are available to women even in remote health centers, midwives are allowed to insert an intrauterine device, conduct manual vacuum aspiration for abortion complications, perform complicated deliveries, and prescribe a number of drugs. Guidelines for the management and treatment of obstetric emergencies were standardized and disseminated nationally and, in several facilities, confidential maternal death audits are being used to assist district health management teams evaluate their quality of care.

3. Costing Issues

3.1 Justification for Costing Maternal Interventions

The overall purpose of this study is to provide policymakers information on the actual costs of delivering maternal health services in Malawi, and on cost differences between facility levels and public and private providers. It assesses how well resources are used in facilities and suggests how to improve the efficiency of service delivery.

The study also gives policymakers information on the costs that clients incur when using maternal health services. These findings are especially relevant within the context of the low socio-economic status of Malawians and their ability to afford maternal health care services.

3.2 Literature Review

Only a small number of studies have been conducted on the costs of maternal health services in developing countries, and very few have been done in sub-Saharan Africa. A wide range of methods have been employed in these studies to measure labor time inputs, use of drugs and supplies, and allocation of joint costs. Several studies (Rosenthal 1991, Family Health International [FHI] 1996, Levin 1997, Dmytraczenko 1998) have costed maternal health services in facilities through the "ingredient" approach. Using this approach, the costs of all of the inputs used in the delivery of a given service were added up and averaged to determine the unit cost of providing that service. In these studies, total cost per service ranges from $3.35 to $24.69 for antenatal care to from $55.83 to $118.44 for cesarean delivery.

An important element in these studies is the measurement of personnel time and allocation methods for joint costs to services. Because the cost of labor is a key component of maternal health services and accurate measurement of both contact time and non-contact time is important to determine efficiencies in time use, studies in Ecuador (FHI 1996) and Bangladesh (Levin 1997) conducted provider observation to determine their time allocation among activities. Studies in Bolivia (Rosenthal 1991, Dmytraczenko 1998) estimated personnel time use through methods such as recall from provider interviews. The disadvantage of the latter method is that the percentage of non-contact time (administrative and personal time as well as non-service days for meetings, training, and vacation) for personnel cannot be accurately estimated.

Other studies have costed maternal health services through estimating aggregate costs based on assumptions of input requirements and unit costs (Maine 1991, World Bank 1993, World Health Organization 1998). These studies estimate costs of inputs based on projected needs rather than actual practices and often calculate the costs of providing services at an "optimal" level.

The advantage to costing actual rather than "optimal" services is that recommendations can be made within a specific country context of financial constraints and varying levels of utilization. The findings can be used to recommend efficiency improvements and to set prices for cost recovery and other financing schemes for maternal health services.

As can be concluded from this short review, relatively few studies of the cost of maternal health care have been conducted in developing countries, and they have used a variety of methodologies. This study in a district of Malawi will attempt to fill part of this gap in cost studies of maternal health services in African countries through a careful investigation of costs of a package of maternal health services using provider observation methods.

4. Conceptual Framework

The costs of maternal health care can be divided into two types[3]: cost of supplying services and cost to the consumer.

The first, supply costs, can be measured in three ways: one is as the addition of all inputs used in the provision of a given service (total costs) which are useful to planners for budgeting purposes. A second way is looking at the unit costs of delivering a single service (average cost) which allows comparisons to be made among services and among types of health facilities. This study looks at both. The third measure is marginal costs, the additional cost associated with delivering one more unit of service; it takes into account varying costs at different levels of output. Marginal costs cannot be calculated in this study because data were only collected at one point in time.

The inputs, or components, that are used to provide services and need to be costed are the following: personnel time spent providing the service, drugs and supplies, utilities, maintenance and repair, and the cost of equipment and other capital expenses. Some factors that affect provider costs include utilization or scale of service delivery and severity of illnesses. Other factors that affect the costs of providing care in a facility are case mix and treatment protocols for interventions.

Provider costs, whether total or average (or marginal), can be disaggregated into direct and indirect. Direct costs are those that are attributed to health service provision such as employee contact time spent on service delivery, costs of medicines, and costs of supplies for a specific service. Indirect costs are the costs of inputs that support services and are often jointly involved in the provision of several services, such as utilities and maintenance. Joint costs are divided among services using one of several types of allocation methods.

The second type of maternal health costs are those incurred by the consumer. These costs include travel and waiting time, transport fees, service user fees,[4] and other expenditures such as purchase of drugs and supplies by the consumer.[5]

[3] Even though these two types of costs are part of total costs, they are separated because of their different implications on financing.

[4] It should be noted that the user fees may contain costs that are already included in costs to the provider.

[5] This cost refers to those drugs and supplies that are purchased by clients outside of the facilities and are not part of the user fees.

5. Study Methodology

The six clinical interventions costed in this study include routine high volume services like antenatal care and vaginal delivery as well as interventions that address complications and emergencies that may arise during pregnancy, childbirth, and the postpartum period. Due to their contribution to maternal mortality and morbidity and high costs of care, the following complications and emergencies were selected for the study: cesarean section, post-abortion care, postpartum hemorrhage, and eclampsia.

The study involved the collection of data on direct costs of providing maternal services such as personnel time, drugs, laboratory tests, and other supplies used in the intervention as well as indirect costs of service delivery such as administration overhead, utilities, transport maintenance, and supervision.[6] Other data were collected on service quality in the facilities and of community providers in order to control for differences in costs. It should be noted, however, that because the study's main intention was to collect data on costs, only limited data were collected on quality. Data on patient costs also were collected in patient interviews at each of the four facilities.

5.1 Direct Costs

Direct costs include those of labor and materials (drugs and supplies).

5.1.1 Labor Costs

In order to obtain information on costs of labor within health facilities, time allocation studies were conducted. Personnel were observed for one week in each facility to determine contact time on maternal services of interest and related non-contact time, such as preparation, recordkeeping, and administration. The observation technique that was used to determine the distribution of employees' time among activities is known as randomized intermittent instantaneous observation. This method involves observing employees at given intervals and recording the employees' activity at the instant of observation on prestructured forms. The function categories in this study included types of health services such as antenatal care. Activities included procedures performed as part of providing those health services (e.g., taking client history, treatment, and counseling) as well as non-contact time such as administrative and personal activities. Using the total number of observations of an employee, the percentage of observations the employee doing a specific activity or function is calculated and multiplied by the employee's salary to obtain the labor costs for that activity or function.

Observations of different workers are randomized, taking into account the desired frequency of observation. The employees that perform the most diverse and complex activities are observed more frequently so that less common events are more likely to be recorded. For example, a midwife might be observed more often than a nursing aide. In this study, personnel interviews were also conducted to determine estimates of non-contact time such as vacation, sick leave, and public holidays.

[6] Because insufficient data was available on capital costs, these were not calculated in the study.

In order to obtain information from community providers, the study conducted interviews with these providers about the amount of time they spent delivering maternal health services, including both contact and related administrative time. Recall data was considered to be preferable to observation because of the small likelihood of observing an event.

When activities could not be observed because they rarely occur, such as in the case of obstetrical emergencies, recall data on time use was used to estimate time costs.

5.1.2 Drug and Supply Costs

After reviewing alternative methodologies for the estimation of direct costs for drugs and supplies, the investigators adapted the Mother-Baby Package Costing approach (World Health Organization 1998) for calculating these costs.

The methodology for estimating direct material costs involves interviewing health providers to ascertain which lines of treatments are followed in the course of a given intervention, and the percentage of clients who receive each line of treatment. To obtain an estimate of the total cost of delivering an average intervention, such as an antenatal visit, the costs of individual lines of treatment, such as a tetanus toxoid vaccine or folic acid supplements, are aggregated using the percentage of clients receiving that treatment as the weighting factor. Table 1 provides an illustrative example.

Table 1. Modified Form for Collecting Data on Drugs and Supplies

Code	Description of Treatment Line	Threat of Miscarriage	Abortion in Course	Sepsis
L	Blood group test	0%	50%	100%
L	Hemoglobin test	0%	80%	100%
M	Blood, one unit	0%	15%	67%
M	Aspirin, tablets 300 mg	0%	0%	0%
M	Gentamicin 40 mg/ml, injection 2ml	0%	0%	33%
M	Ampicillin, injection 1g	0%	0%	67%
M	Ampicillin, tablets 500mg	40%	100%	100%
M	Crystalline penicillin 1MIU	0%	50%	100%
M	Ergometrine maleate, 0.5mg/ml	0%	100%	100%
M	Oxytocin 5 IU/ml	0%	50%	33%

L=laboratory test M=medicine

The cost of each line of treatment is calculated by multiplying the cost of a single dosage by the number of dosages prescribed in a day and then again by the number of days required to treat a given ailment. In this study, Malawi-specific protocols were used in determining dosages.

The protocol was modified to gather information more effectively in the field. When an intervention was subdivided into the various diagnoses it encompasses (e.g., in the case of abortion complications: threat of miscarriage, abortion in course, and sepsis), providers were better able to quantify the number of clients receiving a given line of treatment for the clinical condition specified. The data collection instrument was, therefore, redesigned to reflect the clinicians' diagnostic

approach. This meant that each institution ended up with its own spreadsheet that differed from that of other institutions not only by the percentage of clients receiving various lines of treatment but also by the actual treatments prescribed.

Unit costs for each diagnostic subcategory were then aggregated at the analysis stage of the work to generate an average unit cost for the intervention as a whole. The percentage of clients admitted under each subcategory was used to weigh that diagnosis's contribution to the intervention's total cost.

Recurrent costs for TBAs include drugs and supplies routinely used by the TBA to provide each service.

5.2 Indirect Costs

Indirect costs include costs of labor and other inputs that support the maternal health service but are not directly involved in service provision; examples are utilities and maintenance. Indirect labor costs are divided into those of personnel involved in caregiving (such as a nurse aide), and other personnel who provide more general support services (such as a clerk). The costs of personnel directly involved in maternal health care were divided into non-contact time (e.g., administrative and personal activities) and non-working days (e.g., meetings, training, and vacation). The costs of other administrative and support personnel such as clerks, administrators, accountants, lab technicians, and cleaners were also calculated by allocating the percentage of their time spent on maternal health care services to specific maternal services.

Non-labor indirect costs that were considered included recurrent costs such as expenditures on maintenance, utilities, rent, and food. Information on recurrent indirect costs were abstracted from facility records.

While some data on equipment and capital investments were collected, this information was insufficient to calculate actual costs. In order to generate annualized capital costs, a more detailed inventory of existing equipment would be required. Nonetheless, this data is useful as an indicator of structural differences between facilities. Therefore, a qualitative description of the data is presented in the section on service quality.

TBA equipment and other capital costs were negligible and are not included in these estimates.

5.2.1 Methods of Allocation of Indirect Costs

Distinct methods were used to allocate the following indirect costs to individual services: (1) non-contact time of maternal health personnel; (2) time of support personnel who work only on maternal health care services, but who were not observed during the time allocation study; and (3) general administrative and support personnel and other types of indirect costs.

The cost of non-contact time and non-working days of maternal health personnel was allocated to each service according to the percentage of service time spent on each maternal health activity. For example, if one-third of a midwife's contact time was spent on antenatal care, then one-third of her non-contact time would be allocated to this activity.

The cost of support personnel who provide maternal health care services full-time but whose time use was not observed was allocated to each service by taking the volume of that service as a percentage of the total number of maternal health services, weighted by the length of time required to provide each maternal health activity. The rationale for applying this allocation method is that resource use is positively associated with the average length of time required to deliver care. For example, if cesarean section patients spend an average of eight days at the facility and there are 100 patients (i.e., 800 patient-days), then the percent of a nurse aide's time that will be allocated to cesarean section will be 800 patient-days divided by the total number of maternal health patient-days. This method avoids the pitfall of allocating a disproportionate amount of indirect cost to high volume, non-resource intensive activities such as antenatal care.

The percentage of total patient-days spent on each type of activity provided at the facility (including non-maternal health services) was also used to allocate the cost of general administrative and support personnel as well as other indirect costs such as maintenance activities to individual service.

Because the total number of non-maternal health services was not available for one facility, the public Queen Elizabeth Central Hospital, the indirect costs of administrative and support personnel as well as maintenance were calculated on the basis of the percentge of total personnel costs that went to maternal health personnel.

5.3 Measures of Quality

Measures of service quality are included in the study so that cost differences among facilities could be explained. However, since this study was not designed to examine issues of quality in a comprehensive way and information on process indicators of quality is incomplete, the assessment of service quality is limited. Measures of quality in the study include a combination of structural and process indicators.[7]

Structural service quality is a measure of the extent to which a provider has sufficient equipment and material as well as training to carry out responsibilities adequately. Process service quality in this study measures the extent to which the provider follows standard guidelines, given that the structure is in place. Structural indicators for health facilities included availability of drugs, equipment, and personnel. This information was collected through walk-throughs of facilities with a structured checklist and included the following variables: facility size and space, general cleanliness, availability of key supplies and medicines, availability of standard equipment, and existence and use of systems such as standard treatment protocols, partographs, and recordkeeping.

Process indicators include measures of compliance to guidelines in treatment protocols and client satisfaction. The former was measured through determining the procedures that were adhered to in maternal health interventions when materials were available at the facility. Another measure of process is client satisfaction, which was captured through exit interviews with clients.

[7] Outcome indicators of quality were not assessed because this information was not collected.

5.4 Client Costs

Using facility-based client exit interviews administered over the course of one week, the average costs to the client for maternal health services were estimated. In addition to questions about direct costs to the patient, such as user fees, drugs, supplies, and food related to the visit, questions were asked about travel and waiting time as these can be significant indirect "costs" to the patient. In order to compare client costs to satisfaction, clients were asked to rate the service they had just received in terms of privacy/confidentiality, attitude of health workers, and overall impression with the visit. They were also asked to provide an opinion on how services at the facility could be improved. Cost recovery rates were calculated using the average user fees paid per service compared to the average cost of the service in each facility.

5.5 Service Volume Data

Information on service volume in each facility was available for the 12 months of 1997. The data were collected by type of service and included maternal health services as well as other health services provided at the facility with the exception of the public hospital, where only the volume of maternal health services was available.

6. Sample and Data Collection

Costing of maternal interventions was undertaken in one of Malawi's administrative districts. Blantyre District, located southeast of the capital city Lilongwe, has a population of approximately one million. This district was chosen because it had a range of providers available and services were considered to be of acceptable quality.

In recognition of the various levels of care that deliver safe motherhood interventions, the study focused on health centers, hospitals, and community practitioners. In Blantyre District, there is one public hospital, one mission hospital, several health centers, and numerous TBAs. Queen Elizabeth Central and Mlambe hospitals and Mpemba and Chileka health centers were selected to represent, respectively, public and non-governmental facilities in the district. The selection criteria for health facilities included high volume service, acceptable quality of maternal services offered, and availability of good financial records (see Table 2). Community-level costing included 20 TBAs.

Health providers were interviewed on their time use in and outside of the facilities. Indirect costs were obtained through abstracting the expenditure records for utilities, maintenance, and other overhead costs, including support supervision and administration personnel.

Table 2. The Study Sample Size

Facility/Service	Services Observed	Average Number of Services Delivered/Month	% Total Patient-Days for Maternal Health
Public Hospital			
Antenatal Care	595	2945	NA*
Vaginal Delivery	100	1006	
Cesarean Section	20	109	
Post-abortion Complication	16	13	
Postpartum Hemorrhage	6	4	
Eclampsia	7	6	
Mission Hospital			
Antenatal Care	398	1555	21%
Vaginal Delivery	13	213	
Postpartum Hemorrhage	2	12	
Post-abortion Complication		0.6	
Postpartum Hemorrhage		2	
Eclampsia		0.6	
Public Health Center			
Antenatal Care	212	448	21%
Vaginal Delivery	5	50	
Mission Health Center			
Antenatal Care	57	123	25%
Vaginal Delivery	5	27	
Traditional Birth Attendants (20)			
Antenatal Care	NA	29	NA
Vaginal Delivery		20	

* Total services provided were not available for services other than maternal health at the public hospital.

Data collection instruments were developed to collect the relevant data as outlined above. A multi-disciplinary team of social scientists, economists, and clinicians was constituted and trained for data collection. A pre-test of the instruments was conducted at St. Luke's, an NGO hospital in Chilema, Zomba District, before implementing the study in Blantyre District. The data were collected during June–August 1998.

The two hospitals provided all six maternal health services being studied, both commonly provided services (antenatal care, vaginal delivery, cesarean section, and post-abortion care) and treatment of less common life-threatening obstetrical complications (postpartum hemorrhage and eclampsia). The health centers and community practitioners provided only routine maternal health services, antenatal care, and vaginal delivery.

The data collection on time allocation of health providers in health centers was relatively simple since all maternal health services took place in one location and only involved determining which health personnel were most essential in the provision of services. In the hospitals, however, maternal health services were provided from three separate locations: antenatal care from a public health unit or clinic area; vaginal delivery, post-abortion, and obstetrical complication services at maternity wards; and cesarean sections at operating theaters. In the public hospital, services were also provided from separate locations for paying and non-paying clients.

Observation of health providers in hospitals included four eight-hour periods during daytime shifts and two four-hour periods during evening shifts in the maternity ward as well as two antenatal clinic sessions. While several cesarean sections were observed in the operating theater of the public hospital, none were observed at the mission hospital. In the health centers, four eight-hour shifts were observed.

Table 3. Data Sources

I. Cost Component	**Data Collection Technique**	**# of Providers**
Labor	Randomized intermittent instantaneous observation Recall	Four facilities Four facilities and TBAs
Salaries and Benefits	Record review	Four facilities
Drugs and Supplies (materials)	Provider interviews	Four facilities
Maternal Health Service Utilization	Service record review Provider interviews	Four facilities TBAs
Maintenance and Utility Costs	Record review	Four facilities
This district differs from other districts since a safe motherhood project was being conducted in this district. Supervisory Costs	Interviews with supervisors	Four facilities
II. Measures of Service Quality	**Data Collection Technique**	**# of Providers**
Availability of Equipment and Supplies	Facility walk-through	Four facilities
Treatment Protocols	Intervention observation	Four facilities
Client Satisfaction	Client exit interviews	Four facilities

The study also collected data on TBAs, interviewing 20 TBAs during two weeks to determine the average number of services provided each month and TBA costs of providing services (e.g., drugs, supplies, rent, etc.).

Exit interviews were conducted with outpatient and inpatient clients at the hospitals and health centers. Forty-nine outpatients and 40 inpatients were interviewed in the public hospital, while 38 outpatients and 12 inpatients were interviewed in the mission one. At the health center level, 20 outpatients and five inpatients were interviewed at the public facility, while 18 outpatients and 10 inpatients were interviewed at the mission center.

7. Limitations of the Study

This study is part of a three-country comparison. Due to the funding constraints of this widespread project, the Malawi sample was taken from only one district. As discussed above, Blantyre District was chosen for the study because it offers health care facilities that are among the best in Malawi. It should be noted that Blantyre differs from other districts since a safe motherhood project was being conducted there.

An additional limitation is the small size of the study: two hospitals, two health centers, 20 community providers, and 192 clients. Because the sample size is small, no statistical tests of the costs of providing services were conducted. It is a case study rather than a representative sample.

8. Results

8.1 Direct Costs of Providing Services at Facilities

The unit direct costs of maternal health services in Blantyre District were estimated for four facilities. Personnel time for all six of the services were observed in the public hospital, while three of the six were observed in the mission hospital, due to infrequent occurrence of the other services. In the two health centers, the time allocation for the two services that were provided, antenatal care and vaginal delivery, were observed.

Direct costs include the costs of labor and materials—drugs and supplies—used in delivering the services. Table 4 indicates that direct costs ranged from $2.50 for antenatal care at the public health center to $63.08 for postpartum hemorrhage in the public hospital. Material costs were higher than those for labor for all services but the labor-intensive eclampsia, and they comprised over 80 percent of the direct costs for the hospitals for four of the six services. They constituted over 75 percent of the costs for all services provided at the health centers.

Table 4. Unit Direct Costs of Maternal Health Services by Service and Facility

	Hospitals		Health Centers	
	Public Hospital	**Mission Hospital**	**Public Health Center**	**Mission Health Center**
Antenatal Care				
Labor	$0.26	$0.15	$0.32	$0.42
Materials	$4.44	$5.08	$2.18	$2.94
TOTAL	$4.70	$5.23	$2.50	$3.36
Vaginal Delivery				
Labor	$1.17	$1.24	1.26	$0.62
Materials	$11.34	$6.49	$4.63	$4.65
TOTAL	$12.51	$7.73	$5.89	$5.27
Cesarean Section				
Labor	$2.00	$4.67*	NA	NA
Materials	$54.72	$44.12		
TOTAL	$56.72	$48.79		
Post-abortion				
Labor	$11.29	$1.12*	NA	NA
Materials	$12.87	$18.49		
TOTAL	$24.63	$19.61		
Postpartum Hemorrhage				
Labor	$11.79	$5.74	NA	NA
Materials	$51.29	$46.31		
TOTAL	$63.08	$52.05		
Eclampsia				
Labor	$21.02	$9.43*	NA	NA
Materials	$19.50	$21.07		
TOTAL	$40.52	$30.50		

*Estimated based on interviews with personnel rather than observation

Material costs make up the majority of direct costs for maternal health services for two reasons: the high input prices of materials and low labor costs. Labor costs comprise a small percentage of unit direct costs due to low personnel salaries and high service volume at the facilities. Other factors that affect labor costs are wage rate differentials between public and private (mission) facilities, amount of time spent on services, level of personnel that provide services, and staffing patterns of maternal health providers. Wage rates are 12 percent and 50 percent higher, respectively, for registered state nurses and enrolled nurse/midwives, at the public hospital than at the mission one.

Unit direct costs were higher at the public hospital than at the mission hospital for five of the six services. Labor costs were higher for four of the services in the public hospital,[8] and material costs were higher for three of the services there.

Direct costs were more varied at the health centers. While the mission health center had higher costs for drugs and supplies for antenatal care than did the public center, its material costs were relatively equal for vaginal delivery. On the other hand, while their labor costs were similar for antenatal care services, the costs for vaginal delivery services were higher at the public health center, which used more health personnel than did the mission center.

Across the four facilities, unit labor costs for the routine services categories of antenatal care and vaginal delivery were similar with the exception of vaginal delivery at the mission health center, where costs were only half as much as at the other facilities. Costs were low for these services at the two hospitals due to high service volume. The cost of labor for vaginal delivery was especially low at the mission health center due to the use of fewer personnel (see Table 10 in Section 8.5.2, "Staffing Patterns").

Material costs of drugs, laboratory tests, and supplies were 10 percent to 43 percent higher at the public than the mission hospital for three of the six services. For the other services, these costs were 8 percent to 31 percent higher at the mission hospital. The finding that more materials were used for selected services at the public hospital was probably due to its use by the University of Malawi College of Medicine as a training site for doctors.[9] The higher costs of materials for antenatal care at the mission health center can be attributed to the provision of more drugs to clients.

Direct costs for antenatal and delivery services were higher at the hospital level than at the health centers. The higher costs at hospitals can be attributed to more comprehensive line of treatments, i.e., more extensive treatments for antenatal morbidities and more use of laboratory examinations.

8.2 Indirect Costs at Facilities

The indirect costs include the costs of non-contact time of maternal health personnel, costs of support personnel, and a proportion of costs of maintenance and utilities. The costs have been prorated and allocated to specific maternal health services.

[8] It should be noted that since labor costs for obstetrical complications were based on recall methods of estimation at the mission hospital, they are not strictly comparable to the labor costs based on observation at the public hospital.

[9] Although the public hospital had more drugs and supplies than the mission hospital, this does not necessarily imply that its service quality is better.

Table 5 presents the unit indirect costs for the services that each facility provides. The magnitude of costs is affected by the number of support personnel in the facility as well as quantity of maintenance and utilities used. The latter costs are affected by the amount of equipment used at the facility.

The composition of the costs differed for the different facilities. The cost categories with the largest percentages of total indirect costs was support personnel at the public hospital and mission health center, and maintenance and utilities at the mission hospital.

For each service offered, total unit indirect costs were highest at the public hospital, followed by the mission health center. The costs were as much as 72 percent greater at the public hospital than the mission hospital due to the large number of support staff, equipment, and vehicles. The indirect costs of the mission hospital were lower than those of the mission health center because of relatively low expenditures on non-contact time and supervisory and support personnel.

Table 5. Unit Indirect Costs of Maternal Health Services by Service and Facility

	Hospitals		Health Centers	
	Public Hospital	**Mission Hospital**	**Public Health Center**	**Mission Health Center**
Antenatal Care				
Labor Non-contact Time	$0.03	$0.11	$0.35	$0.38
Support Personnel	$0.29	$0.26	$0.11	$0.42
Maintenance and Utilities	$0.46	$0.17	$0.27	$0.02
TOTAL	$0.78	$0.54	$0.73	$0.82
Vaginal Delivery				
Labor Non-contact Time	$0.25	$0.15	$0.82	$1.45
Support Personnel	$6.71	$1.62	$1.04	$4.21
Maintenance and Utilities	$4.56	$2.26	$2.47	$0.21
TOTAL	$11.52	$4.03	$4.33	$5.87
Cesarean Section				
Labor Non-contact Time	$0.59	$1.46	NA	NA
Support Personnel	$26.83	$4.47		
Maintenance and Utilities	$18.24	$6.67		
TOTAL	$45.66	$12.60		
Post-abortion				
Labor Non-contactTime	$ 6.34	$0.59	NA	NA
Support Personnel	$ 6.71	$3.92		
Maintenance and Utilities	$ 4.56	$5.83		
TOTAL	$17.61	$10.34		
Postpartum Hemorrhage				
Labor Non-contact Time	$1.53	$6.72	NA	NA
Support Personnel	$10.06	$3.36		
Maintenance and Utilities	$6.84	$5.00		
TOTAL	$18.43	$15.08		
Eclampsia				
Labor Non-contact Time	$9.73	$1.26	NA	NA
Support Personnel	$33.53	$8.40		
Maintenance and Utilities	$22.80	$12.50		
TOTAL	$66.06	$22.16		

Mission health center indirect costs were 11 percent to 26 percent higher than those of the public center; the difference can be attributed mainly to higher costs of support personnel. Time spent on labor non-contact time was also relatively high at these facilities as will be seen in Section 8.5.3, "Time Spent on Non-service Activities."

8.3 Total Unit Costs at Four Facilities

Table 6 presents the total unit costs of the six maternal health services provided at the four facilities. The results indicate that costs are 24 percent to 104 percent greater in the public hospital than in the mission one due to greater use of materials, support personnel, and maintenance and utilities. For the health centers, the costs at the mission health center were higher than at the public one.

Table 6. Unit Costs of Services at Four Facilities

	Public Hospital	Mission Hospital	Public Health Center	Mission Health Center
Antenatal Care	5.48	5.77	3.23	4.18
Vaginal Delivery	24.03	11.76	10.22	11.14
Cesarean Section	102.38	61.39	NA	NA
Post-abortion Complication	41.77	29.95	NA	NA
Postpartum Hemorrhage	81.51	67.13	NA	NA
Eclampsia	106.58	52.66	NA	NA

8.4 Costs of Traditional Birth Attendants

Table 7 shows the unit costs of services provided by TBAs. The study found their costs to be limited since they use few drugs and the government provides many of the other materials (gloves, cotton wool, mackintosh, etc.) that they do use. As a result, their expenses are limited to those of food and other supplies such as soap and delivery mats.

Material costs were relatively high for antenatal services since many TBAs distribute vitamin supplements (ferrous sulfate and folic acid) provided by the MOHP. The costs of antenatal care services averaged $0.89 per service, with about one-third paid by the TBA and two-thirds by the MOHP. On the other hand, most of the costs of delivery ($1.92) were paid by the TBA.

Not all of the costs for the deliveries are reflected in Table 7, because some TBAs ask clients to bring some of the supplies. For example, about a third of the TBAs ask women to bring razor blades and soap when they come to deliver. Most of the TBAs also charge fees for vaginal delivery services, while other services, such as antenatal care, are often free. The magnitude of the fees paid to the TBAs for services will be discussed in a later section.

Table 7. Unit Costs of Services Provided by TBAs

	Unit costs per service:		
	TBA Cost	**MOHP Subsidy**	**Total Costs**
Antenatal Care			
Labor*	$0.30	NA	$0.30
Drugs	NA	$0.56**	$0.56
Other Personnel	$0.03	NA	$0.03
TOTAL	$0.33	$0.56	$0.89
Vaginal Delivery			
Labor *	$1.29	NA	$1.29
Materials	$0.15	$0.22	$0.37
Food	$0.09	NA	$0.09
Other Personnel	$0.17	NA	$0.17
TOTAL	$1.70	$0.22	$1.92

* Based on recall of TBAs on time spent per service.
**Assumes 50 percent of TBAs received antenatal drugs from health center for antenatal clients.

8.5 Quality of Service Care

8.5.1 Structural Quality

The current study also conducted an assessment of the structural quality, or availability of drugs and equipment, at the facilities. The findings indicated that key drugs for routine services were available in all four facilities (Table 8). Key drugs for obstetrical complications were available at the two hospitals, but not all were available at the health centers. The mission health center had the fewest key drugs for obstetrical complications. Since obstetrical complications are referred from these health centers to the public hospital, this lack of drugs would only be problematic if they were required to be used as stopgap measures.

The public hospital, mission hospital, and mission health center were found to have most equipment for antenatal care and obstetrics. The public health center was less well-equipped and lacked a baby weighing scale and a few other key equipment. The TBAs were only equipped with a fetoscope and, in 60 percent of the cases, a baby weighing scale.

The majority of clients received all drugs that had been prescribed for them at three of the four facilities: the mission hospital and both health centers. A much smaller percentage of clients received drugs at the public hospital, possibly because more complicated cases requiring more medication were seen at this service site or as a result of understaffing.

Table 8. Availability of Drugs and Equipment in Health Facilities

Availability	Public Hospital	Mission Hospital	Public H.C.	Mission H.C.	TBAs
Key Drugs					
Antenatal Care*	3/3	3/3	3/3	3/3	NA
Delivery**	3/3	3/3	3/3	3/3	
Cesarean Del.***	4/4	4/4	4/4	2/4	
Other ****	3/3	3/3	2/3	0/3	
Prescribed drugs received at exit by clients					
All drugs	48/54%	96%	96%	86%	NA
Some drugs	43/43%	4%	4%	13%	
None	10/3%	0%	0%	0%	
Equipment					
Antenatal Care:					
Fetoscope	Yes	Yes	Yes	Yes	95%
Blood Pressure Cuff	Yes	Yes	Yes	Yes	NA
Adult Weighing Scale	Yes	Yes	Yes	Yes	NA
Obstetrics:					
Working autoclave	Yes	Yes	No	No	NA
Needle holder	Yes	Yes	Yes	Yes	NA
Stitch scissors	Yes	No	Yes	Yes	NA
Forceps (dissecting)	Yes	Yes	Yes	Yes	0
Baby weighing scale	Yes	Yes	No	Yes	60%

* The key drugs for antenatal care were tetanus toxoid, ferrous sulfate, and folic acid.
**The drugs for delivery include paracetamol, dextrose and lidocaine.
*** The drugs for cesarean section include antibiotics, dextrose, oxytocin and diazepam.
**** Drugs for other procedures include oxytocin, diazepam, and hydralazine.

Table 9 shows some process indicators for the four facilities. They indicate whether procedures were conducted based on the availability of materials and equipment. The table indicates that more procedures for antenatal care were carried out in the two hospitals than in the health centers. For vaginal delivery, the mission hospital carried out all or most procedures and the public health center carried out three out of four, while the public hospital conducted only one, the mission health center none. The findings suggest that service quality was better at the mission hospital than the public hospital and at the public health center than the mission center.

Table 9. Process Indicators by Health Facilities

Process Indicator	Public Hospital	Mission Hospital	Public Health Center	Mission Health Center
Antenatal Care (ANC)				
Lab Work for ANC	Yes	Yes	No	No
Health Education during ANC	Yes	Yes	No	Yes
Vaginal Delivery				
Use of Labor Graph	Yes	Yes	Yes	No
Vitamin A given	No	Yes	Yes	No
Infection Prevention Procedures for Eyes of Newborn	No	Yes	Yes	No
Vitamin K given to Newborn	No	Yes	No	No

8.5.2 Staffing Patterns

Facility staffing patterns is another indicator of whether provider resources are being used efficiently and whether quality services are being provided. If resources are not used efficiently, costs will be higher than necessary. For example, if a facility is overstaffed for the number of clients that it receives, labor costs will be high. In contrast, if a facility is uderstaffed, that is, the minimum number of staff necessary to provide services is not available, the quality of service provision could be inadequate.

The staffing patterns at the four facilities were compared to determine if the institutions were efficient in their use of personnel. For example, Table 10 indicates a high service volume for vaginal deliveries at all facilities, with midwives performing at least 150 deliveries per year (see the last column of the table, "Number of Midwives/150 Deliveries"); this resulted in the relatively low labor costs for vaginal delivery that were seen earlier. The number of deliveries performed at the two hospitals were particularly high: 464 and 213 deliveries per year per midwife at the public hospital and mission hospital, respectively. Midwives performed 151 and 164 deliveries per year at the mission and public health centers, respectively.

If the standard is that a nurse/midwife should be able to attend 150–200 deliveries per year in a hospital setting, then the public hospital and possibly the mission hospital are understaffed. The midwives at the health centers conducted fewer deliveries, but the centers are probably staffed adequately since they require replacement personnel at night and during holidays.

Although the staffing patterns of TBAs cannot be compared to those of facilities, they had an annual service volume of 108 antenatal services and 186 deliveries. About half of the TBAs employed an assistant.

Table 10. Use of Personnel by Facility

Facility	# of Services Provided in 1997	# of Midwives	# of Doctors/ specialists	# of Nursing Aides	# of Midwives/ 150 deliveries
Public Hospital	35,530 ANC 12,075 deliveries 1,303 cesarean sections	24 midwives 2 matrons	5 doctors 1 OB/GYN 1 clinical officer	12 patient attendants	0.32
Mission Hospital	18,661 ANC 2,556 deliveries 140 cesarean sections	12 midwives 1 matron*	1 doctor 1 clinical officer	6 nursing aides	0.7
Public Health Center	5,378 ANC 604 deliveries	4 midwives	1 medical assistant	4 nursing aides	1.0
Mission Health Center	1,429 ANC 327 deliveries	2 midwives	1 medical assistant	1 ward attendant	0.92
TBAs (20)	108 ANC 186 deliveries**	1 TBA	NA	45% had assistant	NA

*The matron only worked in the maternity for 10 percent of her time.
**Median figures

8.5.3 Amount of Time Spent on Non-Service Activities

The study also assessed the use of key clinical personnel time at the four facilities to determine how efficiently they were used. If they spend most of their time either on administrative or unoccupied/personal time, their time may not be used in the most productive way. Table 11 shows the percent of total time spent by personnel on administrative and unoccupied time (downtime). Administrative time may include supervisory activities, and supervisors such as state registered nurses would be expected to spend more time on administration than would enrolled nurses.

For state registered nurses, the percent of time spent on administrative activities ranged from 11.4 percent to 27 percent, while the senior enrolled nurses spent 8 percent to 30 percent of their time on this activity. Enrolled nurses spent only about 12 percent to 18 percent of their time engaged in administrative activities, while community nurses and ward attendants were the least likely to take part in administrative activities (from no time to 8 percent of time).

Table 11. Percent of Time spent by Key Personnel on Administrative Work and Non-Work Activities

	Public Hospital	Mission Hospital	Public Health Center	Mission Health Center
State Registered Nurse				
Administrative	11.4%	21.8%	27.0%	
Unoccupied	11.2%	12.8%	10.0%	NA
Senior Enrolled Nurse				
Administrative	8.0%	30.0%	26.9%	
Unoccupied	5.0%	19.0%	15.8%	NA
Enrolled Nurse				
Administrative	11.7%	23.4%	14.8%	18.2%
Unoccupied	16.0%	13.1%	27.9%	22.9%
Community Nurse				
Administrative	0.0%	6.0%	15.5%	6.3%*
Unoccupied	7.0%	18.8%	16.9%	56.3%
Ward Attendant				
Administrative	6.0%	8.0%	8.0%	4.0%
Unoccupied	40.0%	26.9%	31.5%	32.0%

*Worker was the health surveillance assistant.

The state registered nurses were least likely to spent their time unoccupied while the ward attendants were most likely to be unoccupied. The enrolled nurses were unoccupied 13 percent to 28 percent of their time, while community nurses were unoccupied 7 percent to 56 percent of their time.

If nurse time (excluding ward attendants) spent unoccupied is compared, the personnel at the busy public hospital spent the least amount (5–16 percent) of their time on non-work activities, while the personnel at the mission hospital spent more time unoccupied (13–19 percent). At the health centers, the employees were more likely to be involved in non-work activities and were unoccupied 10 percent to 28 percent and 23 percent to 57 percent at the public and mission health centers, respectively.

8.6 Client Costs

8.6.1 Direct Costs

Data on user fees paid to providers and other direct costs incurred by clients were collected from patients who received antenatal care services, delivery services, and services for obstetrical complications. Table 12 provides a summary by facility of the average user fees paid, travel costs, other costs (including the cost of food and outside drugs and supplies associated with the visit), as well as the average total cost paid by the client for each type of service. Because the clients were interviewed before they left the facility, travel costs were assumed to be double the cost paid by the client to reach the facility. Travel costs for companions who accompanied the client to the facility were not included.

Table 12. Costs to Client by Service and by Facility

	Public Hospital (Paying/Non-paying Ward)	Mission Hospital	Public Health Center	Mission Health Center
Average Cost of Antenatal Care	*(13/36)*	*(38)*	*(20)*	*(22)*
User Fees Paid	$7.50/0.00	$0.59	$0.00	$0.94
Travel Costs	$1.13/1.12	$0.51	$0.12	$0.22
Other Costs	$0.07/0.04	$0.09	$0.03	$0.01
Average Total Cost/Client	$8.71/1.16	$1.16	$0.14	$1.16
Average Cost of Vaginal Delivery	*(2/21)*	*(27)*	*(4)*	*(9)*
User Fees Paid*	7.5/0.00	5.45	0.00	1.35
Travel Costs	0.19/1.56	2.37	0.30	0.41
Other Costs	0.00/0.00	0.04	0.06	0.01
Average Total Cost/Client	7.69/1.56	6.46	0.35	1.17
Average Cost of Obstetrical Complication	*(6/10)*	*(5)*	*(1)*	*(1)*
User Fees Paid*	7.50/0.00	1.96	0.00	3.75
Travel Costs	0.20/1.38	0.32	5.63	0.53
Other Costs	0.08/0.02	0.00	0.00	0.00
Average Total Cost/Client	7.78/1.40	1.88	5.63	4.28

*User fees may be incomplete because many of the inpatients had not yet paid their full bills for their stay at the facilities.
**The number in italics (N) designates the number of cases in the sample in each facility.

User fees are not charged officially at public facilities except at paying wards in the hospitals. At the mission facilities, fees are charged for all services.

Client costs for antenatal care services varied greatly, from only $0.14 at the public health center to $8.71 in the paying ward at the public hospital. Average total costs in the hospital's non-paying ward were comparable to those at the mission hospital and health center; however, travel costs for patients in the non-paying ward made up the majority of the costs incurred by the client, while in the other two facilities, both user fees and travel costs made up appreciable amounts of the total.

As expected, when fees are charged, costs to clients for deliveries were greater at the hospital level than at the health center level. Costs reported for deliveries ranged from $0.35 at the public health center to $7.69 at the paying ward of the public hospital. It should be noted, however, that the public hospital cost reported by its clients may not reflect the full user fees paid by inpatients: upon

admission, inpatients pay a deposit of $7.50, equivalent to a day's charge. Patients then pay an amount based on their length of stay at the time of discharge.[10] Interviews with inpatients occurred before discharge and final payment of all fees. Therefore, these estimates may greatly underestimate user fees paid at this facility.

Data on costs to client with obstetrical complications were less reliable because the sample size was small. For example, the $5.63 travel cost to the public health center is based on only one client. Average total costs for clients with obstetrical complications ranged from $1.88 in the mission hospital to $7.78 in the paying ward at the public hospital. However, these were likely to be underestimates since clients were not interviewed upon discharge.

The mean and median user fees charged by TBAs for antenatal care and vaginal delivery routine services is shown in Table 13. The charges were minimal (average $0.05) for antenatal care services but were higher for delivery services: an average $1.37, comparable to the charge at the mission health center. It is likely, however, that few travel costs are incurred by the client to obtain this service.

Table 13. Fees Charged by TBAs (in Malawian kwacha with U.S. dollar equivalents)

	Antenatal Care	Vaginal Delivery
Mean	1.25 MK ($0.05)	36.25 MK ($1.37)
Median	0 MK	42.5 MK ($1.58)
Range	0-10 MK ($0.00 - $0.38)	0-70 MK ($0.0 - $2.63)

8.6.2 Indirect Costs

Waiting Time for Antenatal Care Services

Patients were asked how many minutes they had to wait before they obtained antenatal care. Average reported waiting times varied considerably, ranging from 41 to 85 minutes. At the public hospital, reported waiting times were 48 minutes in the paying ward and 85 minutes in the non-paying ward, reflecting a difference in treatment depending on paying status. The average waiting time was 63 minutes at the mission hospital. At the two health centers, waiting times were estimated by patients to be 41 and 56 minutes at the public and mission facilities, respectively.

Travel Time

Patients were asked how long it took them to travel one way to the facility from their home via the mode of transport they had used that day. Table 14 provides a summary of round-trip travel time by type of service.

[10] The length of stay for clients for deliveries at facilities ranged from one to two days.

Table 14: Average Round Trip Travel Time by Type of Service and Facility

	Public Hospital		Mission Hospital	Public Health Center	Mission Health Center
	Paying Ward	Non-paying Ward			
Antenatal Care	60	62	88	44	56
Vaginal Delivery	40	60	64	66	20
Obstetrical Complications	58	70	96	40	20
All Services	53	64	83	50	32

Reported one-way travel times indicate that most patients seeking maternal health services at hospitals traveled 20–40 minutes to the public hospital and 30–50 minutes to the mission hospital. One-way distances to the health centers were on average shorter: 20–35 minutes to the public center and 10–30 minutes to the mission center.

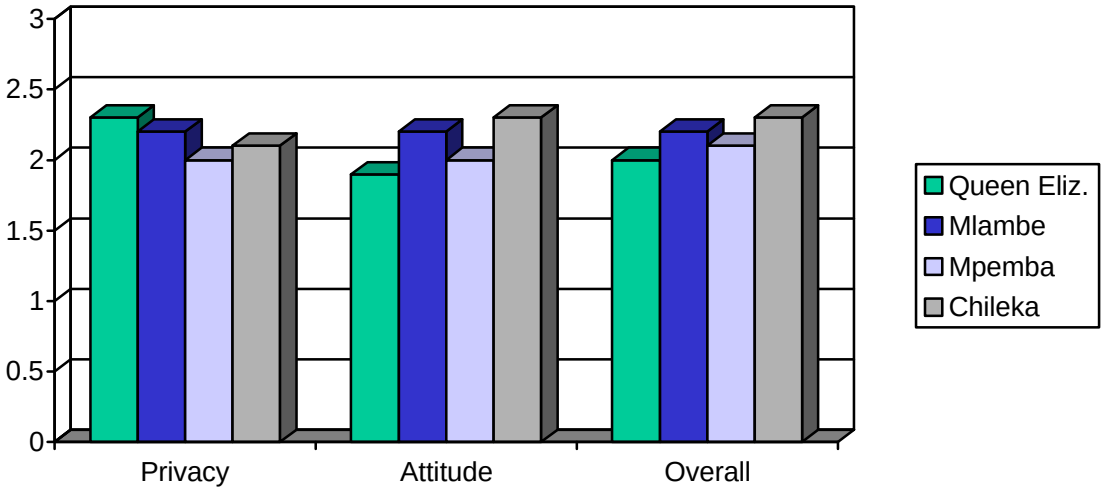
Travel time is considered to be a cost to the consumer and affects their decision making in choosing a facility. However, the sample size in this study is too small to establish the relationship between use and distance. Further research beyond the scope of a patient interview is necessary to fully explain the time clients spend traveling to each facility and their choice of facility based on travel time.

8.6.3 Client Satisfaction

The patient exit interview included several questions regarding client satisfaction. Clients were asked to rank privacy/confidentiality, attitude of health workers, and their overall impression of their facility visit as good, satisfactory, or poor. Patients were then asked how the services they received could be improved.

On the three-point scale of good (3), satisfactory (2), and poor (1), the majority of patients in the four facilities rated their experience satisfactory. Average scores for privacy/confidentiality, health worker attitude, and overall impression of the facility ranged only from 1.9 to 2.3. As seen in Figure 1, despite little variance, the mission facilities scored higher for health worker attitude and overall impression than the public facilities. The mission health center received the highest score for overall impression, while the public hospital received the lowest scores for both health worker attitude and overall impression. The health centers both scored lower for privacy/confidentiality than the two hospitals.

Figure 1. Client Satisfaction by Facility



The most frequently mentioned improvements that public hospital clients suggested were more staff (15 percent), less crowded facility/more beds (14 percent), and less waiting time (13 percent). At the mission hospital, the top three suggested improvements were better health worker attitude (25 percent), cleaner facility (9 percent), and better bathrooms (8 percent). At the public health center, more than one-third of the clients requested better waiting rooms, while 28 percent suggested making improvements to the building itself. Thirty-one percent of the improvements suggested at the mission health center were related to the need for electricity, 21 percent related to increasing the number of beds, and 13 percent requested a cleaner facility. Interestingly, 22 percent of clients at the mission hospital suggested that no improvements were necessary, while 10 percent or less of clients at the other three facilities suggested that no improvements were necessary.

8.7 Cost Recovery

Because fees were not charged in the public facilities except in the paying ward at the public hospital, cost recovery rates are provided only for that ward and the mission facilities. As shown in Table 15, the public hospital recovered the majority of its costs for routine services from clients in its paying ward. The mission facilities, on the other hand, recovered less than half of their costs.

Table 15: Cost Recovery Rates by Service and Facility (fee revenue as % of total direct and indirect costs)

	Public Hospital	Mission Hospital	Mission Health Center
Antenatal Care	133	10.2	22.5
Delivery	62.4	46.3	12.2
Obstetrical Complications	35.9	6.5	NA

9. Discussion

9.1 Costs of Service Delivery

The study found considerable variation in the costs of service provision at the four facilities, both between levels and in public vis-à-vis mission facilities. While it is difficult to draw inferences from total costs of services on relative costs, efficiency, and quality, some conclusions emerge from a comparison of the direct costs of labor and materials as well as indirect costs in the four facilities.

The unit cost analyses indicated that material (drugs and supplies) costs were high compared to other costs and accounted for three-quarters of direct costs. The costs of labor, on the other hand, were relatively small because of low personnel salaries and high service volumes at the facilities. Indirect costs were substantial for all services other than antenatal care and constituted 21 percent to 62 percent of total unit costs.

Direct costs differed between hospitals and health centers. They were higher for hospitals, reflecting greater use of drugs and personnel. Although direct costs were lower in the two health centers (except for antenatal care in the mission health center), the centers were only equipped to provide basic treatment for routine services.

The costs at the public hospital were higher than at the mission hospital (with the exception of antenatal care) due to heavier use of drugs and more support personnel. This finding differs from other countries, where the costs at mission hospitals are often higher than public ones. It may be attributable to the fact that resources are concentrated at this hospital because it is associated with the University of Malawi College of Medicine. In addition, because it is a referral hospital, its case mix is more varied and includes a higher proportion of complicated cases.

Although the public hospital had many resources available, its staffing was inadequate to provide the high volume of demand for routine services. This problem is unusual for hospitals in African countries, where overstaffing is more commonly a problem; it is probably related to the unusually high utilization of maternal health services in Malawi.

The direct costs of traditional birth attendants were lower than other providers for routine services. Drugs and supplies were the most costly input for antenatal care for TBAs. Unlike other countries, TBAs are subsidized by the Ministry of Health and Population and therefore had more key drugs and equipment available, making them a better alternative when other options were not available.

9.2 Efficiency of Service Delivery

The problems of overly high service volume at the public and mission hospital indicates that clients are probably using hospitals for routine services and skipping the health center level.[11] The consequence for the hospitals was that staffing were inadequate, more services were being provided at a higher cost, and key procedures were not being performed, particularly at the public hospital.

Two approaches can be taken to alleviate the problem of overly high service volume: (1) increase the number of personnel in the hospitals and (2) find ways to encourage clients to use health centers for routine services. The latter approach is clearly more realistic given the economic difficulties that the government of Malawi faces.

Another efficiency issue is the amount of time that health personnel spent unoccupied (on personal, or downtime). If we use the criterion that more than 20 percent of time spent unoccupied indicates poor use of time, some of the enrolled nurses and community nurses, and all of the ward attendants fell into this category. Better use should be made of these personnel, particularly ward attendants.

9.3 Quality of Service Delivery

Despite the fact that the public hospital spends more on service delivery and had better availability of drugs and more support personnel, it suffers from understaffing of clinical personnel. The mission hospital scored better on process quality indicators and client satisfaction in the study, the explanation likely being its lower client volume to staff ratio and better management of drugs and personnel.

Similarly, the public health center, while having lower service costs than those of the mission health center, scored better on process quality.[12] The results are probably attributable to the fact that the public center has more, highly skilled personnel to provide maternal health services (four midwives rather than two) and possibly better management.

9.4 Client Costs

Cost recovery was highest at the paying ward of the public hospital, suggesting that this may be an innovative mechanism to introduce user fees at a relatively high level. Since the users of the paying wards are self-selected, the providers do not have to be concerned with the ability to pay of these clients. However, without more information on the percentage of clients that are paying vs. nonpaying, it is not possible to determine the effect of this mechanism on overall cost recovery at the hospital.

Cost recovery rates were less than 25 percent at the mission facilities (with the exception of vaginal delivery at the mission hospital), and they did not appear to be set systematically. The

[11] This non-use of the referral system was corroborated in such documents as The Malawi National Safe Motherhood Strategic Plan (1995?).

[12] However, the mission health center rated higher on client satisfaction than did the public one.

facilities should consider setting some goals for cost recovery. They should also assess whether they can raise their rates in order to recover a larger percentage of their costs. However, before raising fees, studies should be undertaken on ability and willingness to pay by the population. In addition, facilities should consider establishing goals of cost recovery for maternal health services.

9.5 Public vs. Mission Facility Costs

No clear conclusions can be drawn regarding differences among costs and quality of services at the two public and two mission facilities. While the unit cost of all but one maternal health service was higher at the public hospital than the mission hospital, the unit costs at the mission health center were higher than the public one.

Results were also mixed on measures of process quality. While the mission hospital carried out more key procedures than did the public hospital, the public health center performed better than did the mission health center.

10. Recommendations

- *Clients should be encouraged to use health centers rather than hospitals when they only require routine services.*

Since health center costs were lower for routine services and their service quality was acceptable, clients should be encouraged to obtain services there. This would reserve more highly skilled, and therefore costly, hospital personnel for more complicated cases, and the hospital client volume to staff ratio would not be so high. This recommendation complements the assessment of the *Health Expenditure Review* (World Bank 1999) that budget allocations to central hospitals in Malawi are too high and should be reallocated to rural facilities. However, while these tertiary facilities are being overused, it will be difficult to shift funding.

The MOHP should introduce incentives for the use of secondary rather than tertiary facilities. These include: (1) the introduction of a fee structure that charges higher fees at hospitals than at health centers for routine services; (2) promotion of the benefits, such as less crowding, of using health centers, and (3) improving service quality at health centers.

- *Service quality at facilities needs to be improved through the introduction and monitoring of standard protocols for service delivery.*

The study indicated that some standard procedures were not being followed for antenatal care and vaginal delivery. For example, important procedures for the treatment of newborns were not taking place. To encourage the use of standard protocols, checklists should be developed to help supervisors ensure that these procedures are implemented.

- *Facilities should consider setting goals of cost recovery for maternal health services.*

The analysis of unit costs and percentage of costs that are recovered from user fees indicates that cost recovery is low, except for paying clients in the public hospital, and varies for different services. A more systematic method of price setting would assist facilities to reach their goals of financial sustainability. A facility may decide, for example, that at a minimum, it wants to recover a certain percentage of the costs of drugs for a given service; fees can then be set to achieve this goal.

- *Before introducing or increasing user fees, the public sector should assess the population's willingness and ability to pay, to prevent decreasing utilization of services.*

It is important to determine whether the population could continue to utilize maternal health services if fees were introduced or increased. This is important both in terms of evaluating the impact of higher fees on clients' overall demand for services and their choice between public and private providers. In addition, if fees are introduced at hospitals, it will be important to introduce exemptions for lower-income clients who need to be treated for obstetrical complications.

Another factor that needs to be researched before setting fees for maternal health services is the relative importance of consumer costs on the decision to seek emergency health services and the extent to which fees are a barrier to use of these services. While emergency maternal health care services are costly to provide, high fees could deter use. Information on the determinants of

emergency service use and the relative importance of fees could be used by facility managers/administrators in considering rates of cross-subsidization for emergency services from other ones.

- *Managers should review and find ways to reduce the time that staff, particularly ward attendants, spend unoccupied (on downtime).*

- *Additional research issues should be investigated.*

Researchers should investigate issues such as (1) evaluate the success of having wards with higher prices in public hospitals; (2) conduct a more thorough assessment of service quality; and (3) assess whether drugs are overprescribed in these facilities, to gain a fuller picture of drug use.

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