AEP-649

8 3489

MotherCare

STUDY OF THE COSTS AND COST-RECOVERY ALTERNATIVES FOR MATERNAL AND NEONATAL CARE SERVICES AT THE HOSPITAL GERMAN URQUIDI, COCHABAMBA, BOLIVIA

Phase One Report

November 1990

Larry Day, MotherCare/John Snow, Inc.
Gerry Rosenthal, MotherCare/John Snow, Inc.

JSI John Snow, Inc., 1616 N. Fort Myer Drive, Suite 1100, Arlington, VA 22209

STUDY OF THE COSTS AND COST-RECOVERY ALTERNATIVES FOR MATERNAL AND NEONATAL CARE SERVICES AT THE HOSPITAL GERMAN URQUIDI, COCHABAMBA, BOLIVIA

Phase One
Report

November, 1990

Report Prepared for the
Agency for International Development
Contract #DPE-5966-Z-00-8083-00
Project #936-5966

ACKNOWLEDGEMENTS

This report was prepared by MotherCare Consultants Larry Day (Senior Health Management Associate at JSI) and Gerry Rosenthal (Director of Economic Studies at JSI). Among the more conspicuous individuals who were instrumental in bringing about this consultancy and in preparation of this report are Pat Taylor and Allison Percy at JSI, and María Isabel Pueyo and Elizabeth Montoya at the Unidad Sanitaria in Cochabamba, as well as others in Cochabamba and La Paz. Of course, the findings and views presented herein are the sole responsibility of the primary authors.

CONTENTS

I. Executive Summary 1

II. Background 2

III. Description of the Study 4

IV. Hospital Production 5
- A. Utilization 5
- B. Cost-Recovery Experience 9
- A. Cost Analysis Methodology 17
- B. Deriving Unit Costs 22
- C. Deriving Costs of Services through Cost Coefficients 23

VI. The Cost-based Pricing Model 26
- A. Structure of the Model 26
- B. Use and Interpretation of the Model 28

VII. Follow-on Activities 29

VIII. Appendix: Interpretations and Applications of the Cost-based Pricing Model, by Dr. Alfredo Solari, Minister of Public Health, Uruguay 30
- A. Applicability of the Model in the Management of Public Sector Maternity Referral Facilities 30
- B. Implications of Costing Analysis for Ministry-level Planning 32

IX. Persons Contacted in the Course of the Study 35

LIST OF TABLES AND FIGURES

Table 1. Utilization of Reproductive Health Services, 1985-1989
Table 2. Service Mix, Deliveries, 1986-1990 (projected)
Table 3. Average Payments for Deliveries, 1985-1989
Table 4. Payments for Normal Deliveries, January-August 1990
Table 5. Payments for Cesarian Deliveries, January-August 1990
Table 6. Cost Recovery, 1988-1989
Table 7. Estimated Unit Costs
Table 8. Estimated Costs of Services

Figure 1. Discharges by Month, 1985-1989
Figure 2. Patient Days by Month, 1985-1989
Figure 3. Average Length of Stay by Month, 1985-1989
Figure 4. Service Mix 1986, 1989
Figure 5. Distribution of Deliveries, 1986-1989
Figure 6. Relative Charges, by Type of Delivery, 1986-1990
Figure 7. Average Length of Stay by Service, 1990
Figure 8. Payments, Normal Deliveries, January-August 1990
Figure 9. Payments, Cesarian Deliveries, January-August 1990
Figure 10. Cost Recovery, 1988 and 1989
Figure 11. Schematic Representation of Step-Down Allocation
Figure 12. Main Template for Cost-based Pricing Model

I. Executive Summary

This report describes a review and analysis of costs and utilization of maternity services at the Hospital German Urquidi in Cochabamba, Bolivia, based on a consultancy carried out by MotherCare. Over the course of this consultancy, a series of analytic objectives were identified and addressed, in order to fulfill the Consultants' Scope of Work and to meet the management needs of the Hospital. These objectives can be summarized as follows:

(1) To identify utilization trends and their possible relationship to the current fee structure
(2) To review the experience of cost recovery at the Hospital
(3) To provide an estimation of the costs of providing maternity services at the hospital
(4) To make recommendations regarding pricing and marketing of maternal and neonatal services based on these estimates, which would meet the cost recovery targets of the hospital.

Utilization trends: It is apparent that the market for maternity services in Cochabamba is undergoing dramatic changes. The number of women utilizing the services of the Hospital German Urquidi declined approximately 15 percent from 1987 to 1989, but it is not entirely clear whether this is in direct response to the current fee structure. Several factors identified during the course of this study lead to this interpretation. First, there has been a long history of applying fees for maternity services at the hospital. Second, many women are utilizing services elsewhere, both at other public facilities and at the clinics of many new providers who have appeared on the scene over the past few years. Another reasons is that there is an increase in surgical deliveries, indicating a movement toward specialization as a referral hospital, rather than as a primary provider.

Cost recovery experience: The hospital has been extremely successful at meeting its cost recovery targets, approaching 100% of target. And, the revenues for the hospital have steadily increased over recent years. It is also believed that the current revenues of maternity services are generating surpluses which effectively cross-subsidize other services such as pediatrics, indicating significant potential for extending waivers, offering free services, and providing "bundled" packages of services such that prenatal care can be prepaid as part of the charges for deliveries.

Cost estimates: An analysis of average unit costs provide additional detail to identify areas where prices can be manipulated or additional services can be bundled, while maintaining the levels of cost recovery necessary to operate the facility.

Prices: A pricing model based on the estimated costs of services allows hospital administration, financial and planning personnel to project costs and revenues based on different utilization scenarios. This model is described in the report, and an interactive computerized version developed for this study allows on-going modifications and provides a basis for applications to other facilities.

Each of these aspects is described in more detail in the following report. Based upon this study, the Ministry of Health in Cochabamba will be better able to modify prices, anticipate utilization and revenue trends, and work proactively toward positioning the public sector facilities to provide targeted services to the population in need in a market which is rapidly expanding and diversifying.

II. Background

This study explores the costs and cost-recovery experience of the Hospital German Urquidi in Cochabamba, Bolivia and develops a simple pricing model for meeting the institution's cost-recovery targets. It was undertaken as part of a set of MotherCare activities designed to help improve the utilization and quality of public maternal and neonatal services in Cochabamba, Bolivia. Additional studies to be carried out by MotherCare include a household survey and qualitative studies to examine patterns of service utilization as well as client attitudes, preferences, and behaviors within the overall medical service delivery context. The results of these studies will be utilized to improve public sector pricing policies and to support an IEC campaign to promote increased utilization of appropriate maternal and neonatal services.

The Hospital German Urquidi, operated by the Ministry of Health (MPSSP) serves as a referral setting for maternity and pediatrics services, as well as being a primary provider, for the Cochabamba region. While housed in a single institution and, ultimately, drawing on many of the same revenues, the two services are treated as separate, with most administrative, staffing, and support functions operated independently for each. This study only looked at the maternity side of the institution.

The interest in the cost and cost-recovery experience of the Hospital German Urquidi reflects a number of concerns. In 1987, as part of a "privatization" effort, the MPSSP initiated a local cost financing program which called for the establishment of fees for services rendered at all MPSSP facilities. Under this program, the MPSSP continues to pay the costs of permanent personnel and capital expenditures, but support for other recurrent operating costs are eventually to be recovered from patient fees. The experience of the hospital over the past few years should provide some insight into the long-run viability of that goal.

Of equal importance, during this same period there has been a decline in the number of births at the Hospital German Urquidi. Some have interpreted this change as a response to the cost-recovery effort and are concerned that appropriate patterns of utilization cannot be achieved when patients are required to pay for services. Institutional birthing is generally underutilized in Cochabamba. Any further limitations on use generated by patient fees are seen as conflicting with the overall need to raise the quality of services and to promote safer maternal experiences by encouraging the appropriate use of services. Since the hospital is the referral facility for the Cochabamba region, changes in its utilization experience will have to be interpreted in the context of maternal and neonatal services in the region as a whole.

Clearly both of these issues are central to any assessment of cost-recovery efforts. The move to cost-recovery is typically a response to inadequate public resources to support an appropriate level and quality of services. The capacity to generate adequate revenues through user fees depends on effective pricing and the impacts of prices on utilization. Yet the generation of revenues is not the objective of the system. Producing adequate revenues while failing to provide needed services is not an acceptable outcome. Understanding the relationships among prices, pricing policies, and utilization of services is essential to the design and implementation of effective cost-recovery programs. This study contributes to that understanding, for maternal and neonatal services in the Cochabamba region.

The analysis here is not intended as an academic exercise. Its goal, as with all of the MotherCare activities, is to support the development of initiatives which will improve the utilization and quality of effective maternal and neonatal services. In the case of this study, the objective is to develop and share tools which can be used by the MPSSP and the hospital for making the cost-recovery effort more effective while supporting the improvement and expansion of services. To facilitate this effort, the study has been reviewed by Dr. Alfredo Solari, an expert in health administration and planning and, currently, the Minister of Health for Uruguay. His comments have been specifically directed at interpreting findings and how the pricing model might be used at the ministry level to improve planning for services. His comments are appended to this document.

The major focus of the study is on the costs and pricing experience of the hospital and the development of a simple model that links the cost structure to pricing policies. However, the utilization experience was also assessed to identify possible issues that need to be explored further. A full understanding of the utilization experience is only possible in the context of the service delivery system as a whole. Other planned MotherCare activities will provide a fuller picture.

III. Description of the Study

The initial phase of the study was carried out over a two-week period in November, 1990. During this time, the consultants and their counterparts met with appropriate staff of the hospital and the MPSSP to identify issues and to identify sources of accessible data. During those discussions, two additional aspects of the problem being addressed were identified:

1. The overall decline in the number of deliveries was not accompanied by a reduction in the occupancy rates of the facility.

2. The hospital has been collecting fees since its earliest accessible patient records (1972). The widespread institution of the MPSSP cost-recovery program in 1987 was not a new initiative for the hospital, although a new fee schedule was established at that time.

For these reasons, it was decided to examine a longer period starting well before the new program of cost-recovery. The study explores both the utilization and the patient payment experience for the period 1985-1989 with analyses carried out, where appropriate, through August 1990, the last month for which full data were available. Although the hospital provides nonmaternity-related gynecological services, this phase explores primarily maternity services, which represent the great majority of all nonpediatric services provided by the hospital.

All data were obtained either from the original records or, in the case of costs and utilization, from the monthly summaries routinely prepared by the hospital staff. While almost no records are computerized, there is a small statistics unit which proved quite able to locate and provide access to the physical records. The original, handwritten and typewritten information is well organized. All patient medical records are maintained in the statistics office. Billing and payment records are retained in the payment office for approximately one year. Earlier payment records dating back to 1985, packed in one-month bundles, are stored in another part of the hospital but arrangements were made to make these data available to the team as well.

The study has two goals: (1) to describe the actual experience of the hospital, and (2) based on that experience, to develop a model that explores the implications of that experience for future action. The results of the effort are described below.

IV. Hospital Production and Cost Recovery Experience

A. Utilization

Utilization data were obtained from the monthly compilations of daily records from each service in the hospital. A summary of these data for reproductive health services for the period 1985-1989 is presented in Table 1 and the separate components, discharges, patient-days, and average length of stay (ALOS), are displayed in Figures 1-3 respectively.

TABLE 1

UTILIZATION OF REPRODUCTIVE HEALTH SERVICES, 1985 - 1989

	YEAR				
	1985	1986	1987	1988	1989
Patient Days	9,901	12,478	15,731	16,356	16,231
Discharges	3,344	3,807	4,106	3,717	3,498
ALOS	2.96	3.28	3.83	4.40	4.64

Underlying the 5-year data for discharges presented in Figure 1 are two distinct patterns. The period from 1985 through mid-1987 is characterized by wide month-to-month fluctuations in, and an increasing average monthly number of, discharges. The period from mid 1987 through 1989 is characterized by a much narrower range of month-to-month fluctuation and a declining average monthly number of discharges. Overall, the data demonstrate the decline in discharges noted earlier.

While the number of discharges declined during the past three years, other measures of total production have continued to increase. Patient-days per month, as displayed in Figure 2, rose from an average of 825 in 1985 to an average of 1363 in 1988, an increase of 65%. Patient-days changed little in 1989. Here, too, the range of monthly variation was considerably wider during the early part of the period, with recent fluctuation occurring within a narrower range.

FIGURE 1
DISCHARGES BY MONTH
1985 - 1989

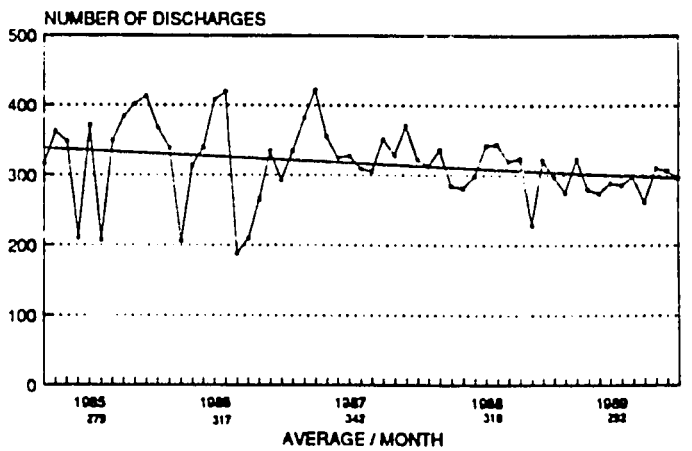


FIGURE 2
PATIENT DAYS BY MONTH, 1985-1989
GERMAN URQUIDI MATERNITY HOSPITAL

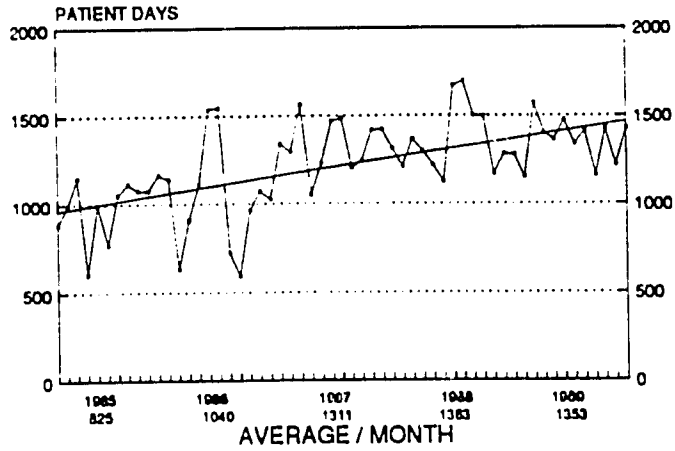
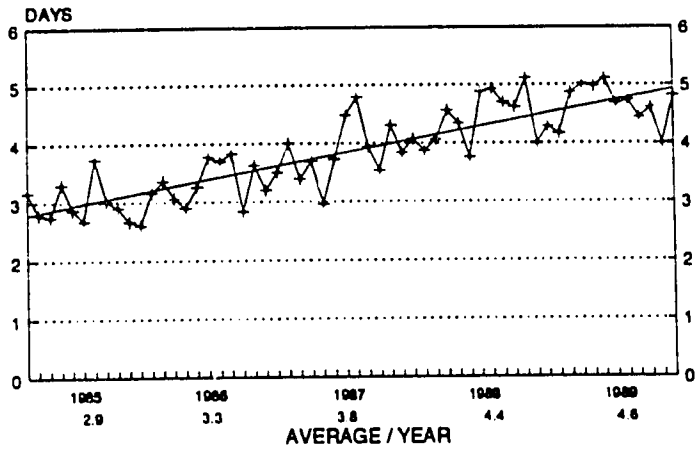


FIGURE 3
AVERAGE LENGTH OF STAY
MATERNITY, 1985 - 1989



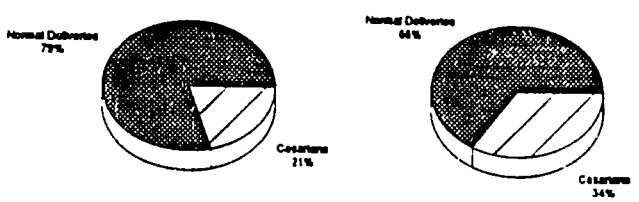
The decline in discharges, together with increasing patient-days, reflects a continuous increase in the average length of stay (ALOS) during the entire five-year period (Figure 3). From a stay of less than three days in 1985, ALOS increased to 4.6 days in 1989. Such a change could reflect a response to declining admissions in the form of delayed discharges. However, the rising ALOS is a longer term trend which was occurring even when discharges were rising. This fact suggests more fundamental changes in the activities carried out in the hospital.

The view that the changes in utilization reflect changes in the mix of activities is supported by the fact that, in 1990, the ALOS for normal deliveries was approximately 2.9 days, probably not much different than in 1985. The fact that the ALOS for discharges as a whole in 1985 was quite similar indicates that there was little variety in the service mix at that time. The rise in ALOS for 1989 indicates that the hospital is providing an increasing amount of other services with significantly longer ALOS.[1] The data on mix of delivery services from 1986 through 1990 (projected) support this conclusion (Table 2).[2]

TABLE 2
SERVICE MIX, DELIVERIES, 1986-1990

VOLUME OF PRODUCTION	1986	1987	1988	1989	1990 (proj.)
Normal Deliveries	2110	2258	1896	1655	1482
Cesarians	550	618	657	679	748
Complicated Deliveries	62	40	33	42	12
Premature Deliveries	21	33	35	20	17
Twins	34	22	20	24	8
TOTAL	2777	3171	2641	2420	2264
PROPORTIONAL PRODUCTION					
Normal Deliveries	76%	76%	72%	68%	65%
Cesarians	20%	21%	25%	28%	33%
Complicated Deliveries	2%	1%	1%	2%	1%
Premature Deliveries	1%	1%	1%	1%	1%
Twins	1%	1%	1%	1%	0%
TOTAL	100%	100%	100%	100%	100%

FIGURE 4
SERVICE MIX
NORMAL DELIVERIES AND CESARIANS

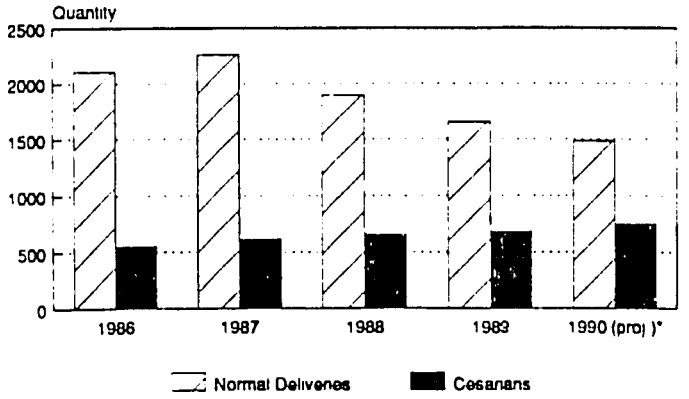


1986 1989

[1] Questions of process or quality of care which may contribute to these patterns were not explored in this study.

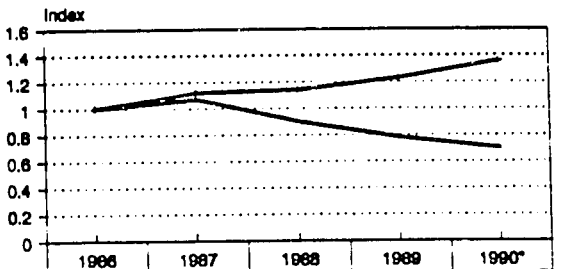
[2] The projections for 1990 were derived by assuming that the actual experience for January through August would continue proportionately through the end of the year (that is, data for the eight months were annualized).

FIGURE 5
DISTRIBUTION OF DELIVERIES, 1985-1989
NORMAL AND CESARIAN DELIVERIES



* projection based on Jan - Aug. data

FIGURE 6
RELATIVE CHANGE IN DELIVERIES, 1986-90
REGRESSION - INDEX: 1986 = 1.0

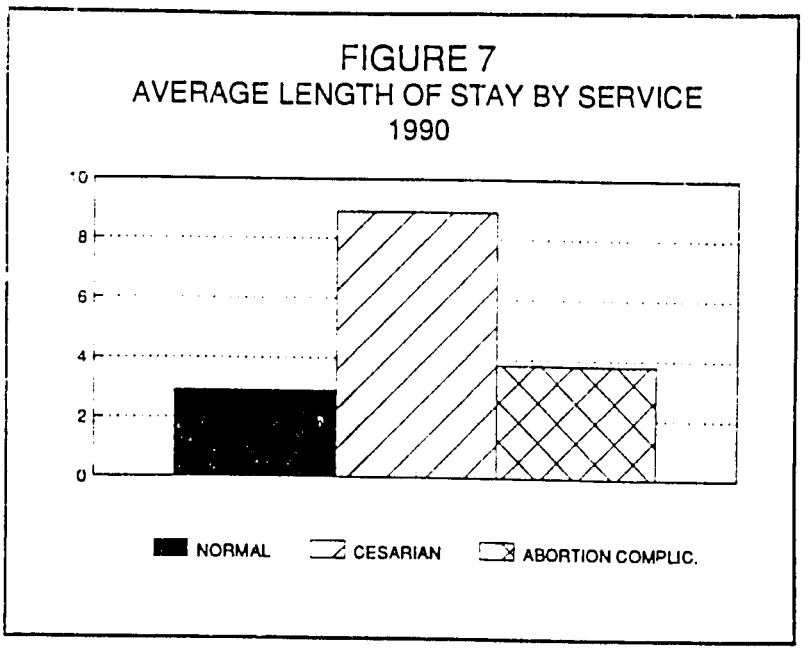


	1986	1987	1988	1989	1990*
Normal Delivenes	1	1.07	0.9	0.78	0.7
Cesanans	1	1.12	1.14	1.23	1.36

Normal Delivenes Cesanans

* Projected from January-August data

In 1986, normal deliveries represented over three-quarters of all deliveries at the hospital. Projections for 1990 indicate a decline to less than two-thirds. Cesarians, on the other hand, increased from 20% of all deliveries to 33% over the same time period (Figure 4). The differences in relative changes for these two services are presented in Figure 5, which shows that the five-year period ended with 30% fewer normal deliveries and almost 40% more cesarians. The relative change in production of the two types of deliveries over the period is presented in Figure 6. While there was an increase in both types from 1986 to 1987, from 1986 to 1990, normal deliveries declined by almost one-third while cesarians increased by over 30%. The implications of these changes for ALOS are demonstrated in Figure 7, which presents ALOS by service. The ALOS for cesarians (8.9 days) was approximately three times that for normal deliveries (2.9 days).



The increase in more complex procedures is not limited to deliveries. The hospital statistics office noted a continuing increase in abortion-related complications since their management was officially recognized as an appropriate procedure, and "tumors" (probably hysterectomies) during the past few years. Each of these procedures has an ALOS significantly greater than for normal deliveries.

Changes in the service mix do provide an explanation for the continued expansion of hospital production in the face of declining overall deliveries. Yet these observations do not provide a basis for determining what role user charges have played in the decline in normal deliveries at the hospital or what these changes in the use of the referral hospital imply for the overall quality of and access to appropriate maternal and neonatal services in the Cochabamba region.[3] While much of the data needed to make this assessment will be generated as part of other MotherCare activities in the area, an attempt was made to ascertain the degree to which the supply and/or use of maternity services outside of the hospital changed during this same period.

There is considerable anecdotal evidence to indicate significant increase in the supply of maternity services in the region during the past few years. Although there was little time for field activities outside the hospital, the team did explore this issue informally in three ways: (1) analysis of newly registered clinics, (2) a visit to a periurban general hospital, and (3) informal discussions with some private physicians.

---

[3] There can be several reasons for the change in the mix of services, including a change in standards of practice, a change in referrals, or a process of "market segmentation", as discussed in more detail below.

Analysis of newly registered clinics: In the offices of the Unidad Sanitaria there is a registration "required" for new clinics, but fees are high and many providers are not registered. In particular, physicians practicing from their homes who add a few beds are rarely registered, although they may represent a significant setting for medically assisted deliveries. Even under these conditions, more than 20 new clinics had registered in Cochabamba during the past two years.[4] As a follow-up, each was contacted by phone to determine if they provided maternity services, whether they had inpatient beds, and what charges they levied. Unfortunately it was not possible to obtain this type of information by phone.

Visit to a periurban hospital: The team also visited the MPSSP hospital in Quillacollo, a rapidly growing periurban area also targeted for the MotherCare field survey. The medical director reported that, during the past two years, there had been a significant increase in deliveries at the hospital. He attributed this to the impact of a group of 18 mothers' clubs organized in small communities and neighborhoods served by the hospital and suggested that many of these women would have delivered without medical attendance under other circumstances. While the hospital had experienced an increase in deliveries, the area as a whole has had a major increase in private physicians as well. Many physician's offices are observable within 5 blocks of the hospital and it was reported that there were now over 22 offices as compared to only 4 two years earlier. While it was not possible to determine the mix and volume of services, most (if not all) of the offices claimed to provide maternity services.

Informal discussions with private providers: The team also visited two different private physicians' offices in Quillacollo. Both offered maternity services, but with dramatic differences in the quality of those services. One pair of physicians, brothers who have practiced in the community for more than a decade, operated a well-constructed, clean facility with approximately 12 beds and lab and surgical capabilities. They noted a significant decline in deliveries from four per day 3-4 years ago to one per day, and attributed that to an increasing number of physicians in the area. Nevertheless, they had a stable, well-organized and well-staffed office (one of the best the team had viewed in such an area) and did not note equivalent reductions in the demand for other services.

The other physician operated in a storefront in the center of town, within a few blocks of at least 5 other physicians and only a few minutes' walk from the previously visited facility and the hospital. His office had little equipment, a small operating space, obviously poor hygienic conditions, and could provide effectively only a rudimentary level of service. In a room adjacent to his office, there were 5 beds for inpatients, one of which was occupied by a woman being treated for "a poor delivery by another physician in the area ending in a stillbirth." He indicated that many of his patients came to him from rural areas because he spoke Quechua and that he did "many" deliveries.

While the contrasts in quality of care were quite evident, it is important to note that there were few differences in the prices charged for a simple delivery by the private physicians. Both of them charged considerably more than the 70Bs charged by the local hospital and somewhat less than the average of 140Bs paid for a normal delivery in the Hospital German Urquidi, although the

---

[4] This registration fee is not only relatively high but is not enforced. It may in fact discourage providers from registering and, though it may be seen as a source of revenue, may run counter to monitoring and information objectives.

physician brothers noted that some of their patients paid lower prices, paid for deliveries over time, or even received services gratis.

While hardly definitive, the above experiences reinforce the view that this is a dynamic and growing market for maternity services which has seen significant increases in supply during the last three years. It is not clear how this has impacted on the actual utilization of services, but changes of this magnitude will clearly have impacts on the demand for services in the regional referral facility. The changes observed in product mix at the Hospital German Urquidi are consistent with the growth of considerable competition for simple deliveries, while the overall growth in the market (albeit still relatively small given the population) would lead one to expect a steadily increasing complexity of care at the hospital. Further exploration of this market behavior will be incorporated into the ongoing MotherCare activities.

B. Cost-Recovery Experience

Payment experience: In 1987, as part of the GOB "Privatization" program, all MPSSP service-providing institutions were required to institute a program of cost-recovery designed ultimately to generate all recurrent operating costs other than those for permanent personnel. For the Hospital German Urquidi, this represented a formalization of cost recovery targets but not a new policy for the hospital. Past records of fee schedules are not available since, prior to 1987, the hospital was a unit of the larger MPSSP facility, the Hospital Viedna.[5] However, patient records as far back as 1972 were reviewed, indicating that patients paid for services on a routine basis.

As part of the cost recovery program, a new price list for services was developed which probably represented a considerable increase in charges but, because earlier fee schedules were not available, that remains speculative. On the other hand, records of actual patient payments since 1985 were stored in the hospital and made available to the team by the payment office. An estimate of payments for the years 1985-89 was derived by selecting the first eight normal deliveries and the first four cesarians from a selected month in each of the five years.[6] The results of that exercise are presented in Table 3.

For this first iteration, it was not possible to develop an adjustment mechanism to compare these payments in real terms.[7] Nevertheless, recent payments do represent amounts somewhat higher in real terms than those of earlier periods. However, the earlier payments were not inconsequential amounts, indicating that fees had more than a token function. For the earlier part of the period, it is

---

[5] The Hospital Viedna did not have any records of earlier fee schedules.

[6] The payment records were stored in a dark closet in one of the patient rooms with a large quantity of other records, not well identified. The selection process consisted of pulling out packages until one package of the patient payment records was accessible for each of the five years. No basis exists for estimating the "randomness" of this procedure.

[7] Though it is possible to index costs based on prices of staple, minimum wages, exchange rates, or other techniques, this is particularly difficult owing to the hyperinflation experienced by Bolivia throughout the early 1980s.

not possible to derive any estimate for those who received free services. Nevertheless, the recent experience in the hospital indicates that few patients received services completely free-of-charge. Since all payments, however small, are retained in the records, these averages may represent the typical expenditures.

Table 3
Average Payments for Deliveries

	Current Prices x 1,000,000 Pesos or x 1 Bolivianos		Constant 1989 Bolivianos	
	Normal	Cesarians	Normal	Cesarians
May 1985	5	6	27	33
Jan. 1986	64	107	95	158
Feb. 1987	78	96	102	126
July 1988	169	224	177	235
March 1989	178	309	178	309

A more extensive analysis was made of patient payments for the period January through August 1990. A sample of patient payment records was obtained by taking all records from the first week in each of the months in 1990 for which records were complete (January through August). From this sample, all normal deliveries and cesarians were identified by linking the patient numbers on the diagnostic records in the statistical office with the patient numbers on the payment records.[8] From these samples, profiles of the components and amounts of payments for each service were derived.

In 1990, the average payment for a normal delivery was 144Bs, approximately $44 US (Table 4). Although the range of payment was wide, the distribution was highly concentrated, with more than half of the patients having paid between 120Bs and 140Bs (Figures 8A and 8B). Almost 25% of these costs were for drugs, blood, and supplies, this category averaging 29Bs per delivery. When payments for these services are excluded, the range is even more concentrated, with over half of the patients paying between 101Bs and 110Bs.

TABLE 4
PAYMENTS FOR NORMAL DELIVERIES, JAN-AUG 1990

PAYMENT	WITHOUT MEDICATION	TOTAL
< 80	3%	
81-90	10%	
91-100	20%	2%
101-110	51%	3%
111-120	10%	3%
121-130		20%
131-140		31%
141-150		15%
151-160	2%	14%
161-170	2%	
>171	2%	12%
AVERAGE PAYMENT:	105	144

[8] Time prevented carrying out this same procedure for other diagnostic categories. However, extending this analysis to other diagnoses would be desirable.

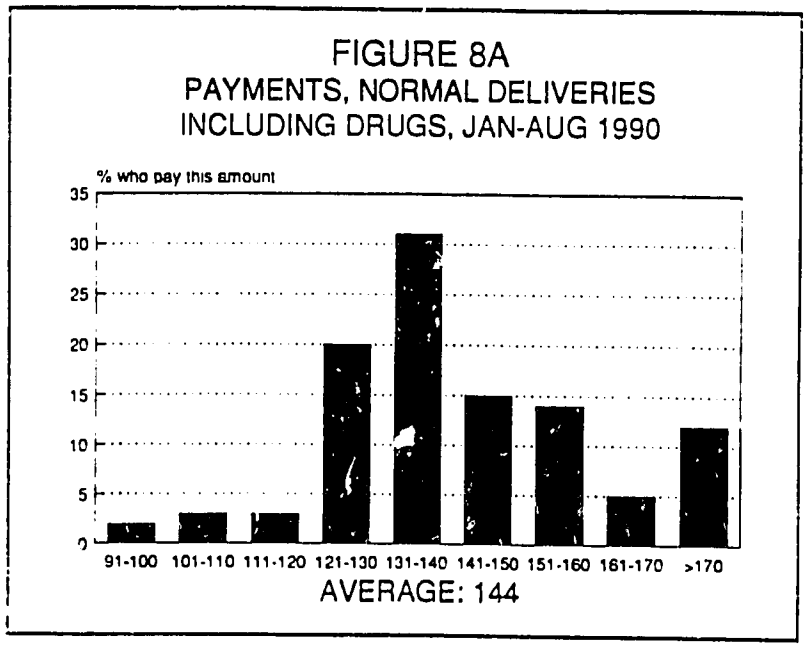


FIGURE 8A
PAYMENTS, NORMAL DELIVERIES
INCLUDING DRUGS, JAN-AUG 1990
% who pay this amount
35
30
25
20
15
10
5
0
91-100
101-110
111-120
121-130
131-140
141-150
151-160
161-170
>170
AVERAGE: 144

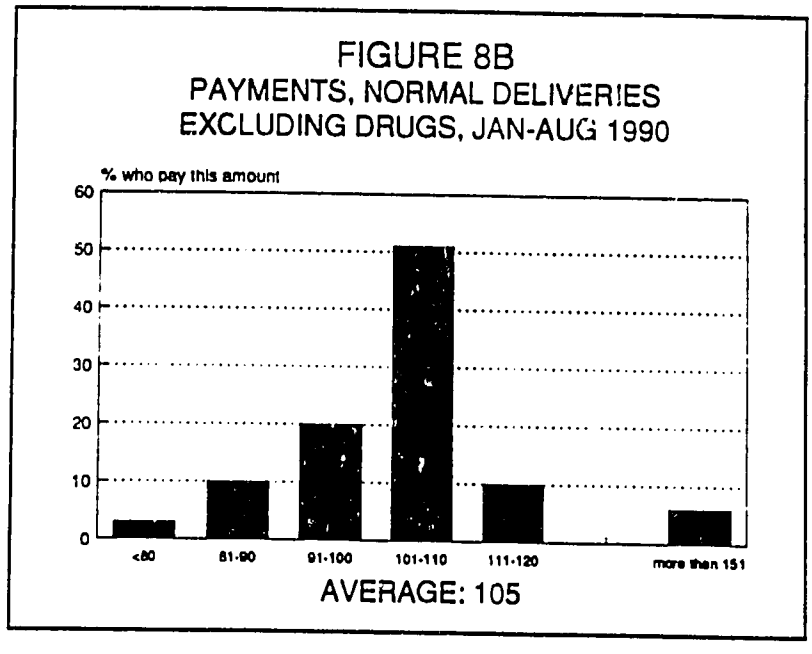
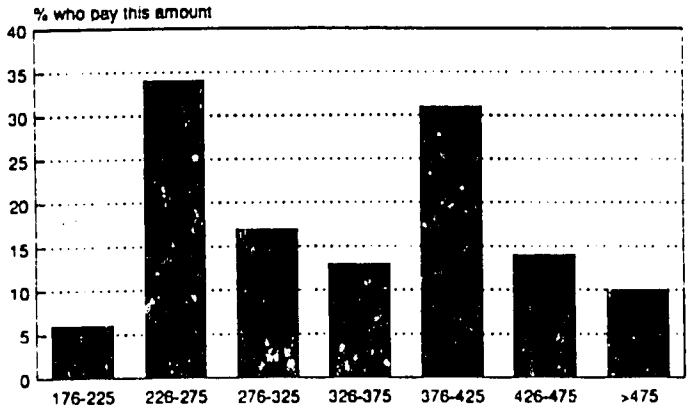


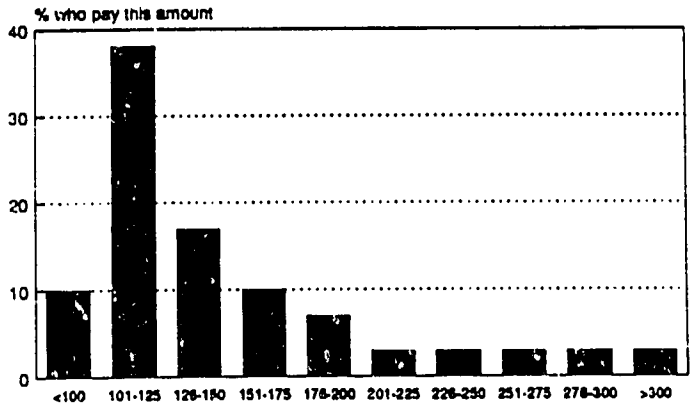
FIGURE 8B
PAYMENTS, NORMAL DELIVERIES
EXCLUDING DRUGS, JAN-AUG 1990
% who pay this amount
60
50
40
30
20
10
0
<80
81-90
91-100
101-110
111-120
more than 151
AVERAGE: 105

FIGURE 9A
PAYMENTS, CESARIANS, INCLUDING DRUGS
JANUARY - AUGUST, 1990



AVERAGE: 331

FIGURE 9B
PAYMENTS, CESARIANS, EXCLUDING DRUGS
JANUARY - AUGUST 1990



AVERAGE: 163

It should be noted that the hospital has no fixed fee for a delivery (or other inpatient services). Rather, the patient is charged separately for room, admission, drugs, delivery suite, etc. The consistency in payment reflects the relatively standard nature of the services. However, there is a sign posted in front of the billing office in the hospital entrance that says: "BIRTHS: 140Bs." It was placed there in response to the fact that women frequently ask for fee information.[9] The frequency of "shopping around" suggests price sensitivity although not necessarily price elasticity.[10]

TABLE 5
PAYMENTS FOR CESARIAN DELIVERIES, JAN-AUG 1990

PAYMENT	WITHOUT MEDICATION	TOTAL
<100	10%	
101-125	38%	
126-150	17%	
151-175	10%	
176-200	7%	3%
201-225	3%	3%
226-250	3%	10%
251-275	3%	24%
276-300	3%	14%
301-325		3%
326-350	3%	10%
351-375		3%
376-400		3%
401-425		
426-450		7%
451-475		7%
476-500		
500-600		10%
AVERAGE PAYMENT:	163	331

Table 5 presents the same information for cesarian deliveries. For this procedure, the range of payments is both higher and wider, particularly for total charges (Figures 9A and 9B). Although the average payment was 331Bs, 10% paid more than 500Bs. Over half of these costs, on average, are for drugs, blood, and supplies. Without this category, payments for cesarian deliveries averaged 163Bs.

Throughout this analysis, it was not possible to determine the degree to which patients were paying less than the full fee for any service other than the room rate. The hospital has a specific review system which establishes partial or no room fees based on an assessment of the patients' economic circumstances. While other reductions in charges occur, the system is less well established and often not recorded on the final payment form. Since the room fee, particularly for cesarians, is a small part of the total charges, it seems likely that many fees are waived or reduced, but no means exist to estimate the importance of this occurrence. It should also be noted that patients who pay no part of their bill will not show up in the sample. Therefore, these data present average payments for those who pay something, not average payments for all deliveries.

Revenue generation experience: As noted earlier, the cost-recovery program set a goal of generating revenues sufficient to cover all of the operating costs other than the costs of permanent personnel. The team assessed the hospital's progress toward this goal by analyzing the monthly income and expenditures for the years 1988 and 1989. Revenues are generated from two sources, the sale of services and the sale of products. As part of the MPSSP labor agreement, one-third of the

---

[9] Such inquiries were seen to have taken place several times during casual observation of the billing and cashier's stations.

[10] Price sensitivity simply means that the consumer would prefer to pay less for a product if that product can be found, while price elasticity refers to the propensity of the consumer to forego that product, or to consume more or less of that product, depending on the prices charges.

revenues from the sale of services are placed into a common fund and distributed equally to the permanent staff of the hospital. Table 6 presents the total revenues and target expenditures by category for 1988 and 1989. It also identifies revenues from the sale of drugs and expenditures for the purchase of drugs.

TABLE 6
COST RECOVERY, MATERNITY, 1988 - 1989

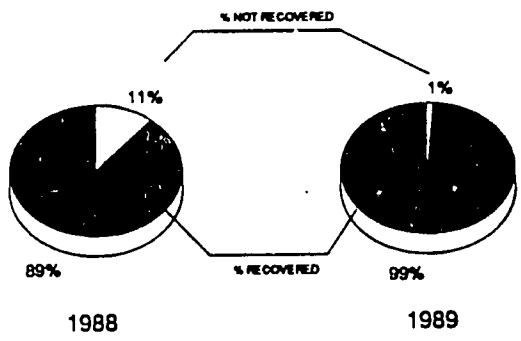
	1988		1989	
REVENUE				
Sales of services		406,995		461,553
Sales of products		367,582		391,721
Pharmaceuticals	334,057		356,945	
Others		24,673		45,975
TOTAL INCOME		799,250		899,249
EXPENSES				
Non-personnel costs		888,613		910,240
Pharmaceutical costs		439,867		391,648
% COST RECOVERY				
Pharmacy		76.1%		91.1%
TOTAL		89.9%		98.8%

Source: MPSSP, Estados Financieros - Gestion 88y89

Overall, the hospital has been quite successful in meeting its cost-recovery goals (Figure 10). In 1988 it recovered almost 90% of its targeted costs. In 1989, it recovered almost 99%. With respect to recovery of drug costs, the improvement in cost recovery from 76% to 91% reflects a 10% reduction in drug expenditures more than an increase in drug revenues. This might have several explanations. It could indicate the influence of cost-recovery on improved management of purchasing, or it could be the result of changes in prescribing practices, or it could be related to the willingness of patients to pay for drugs.[11]

The next section explores the current costs of producing these services and relates these costs to the individual prices to be charged.

FIGURE 10
COST RECOVERY, 1988 AND 1989
TOTALS, EXCLUDING PERMANENT EMPLOYEES



Source: MPSSP Estados Finanancieros 1989

[11] It should be noted that the pharmacy supplies, inventory, receipts, and expenditures are the only computerized records in the hospital. This reflects the high priority given to managing this component of the institution effectively.

V. Costs of Producing Services

As noted above, the revenue target for the MPSSP facilities is to recover all recurrent operating costs other than the costs of permanent personnel, which are paid from central MPSSP funds. The objective of the cost analysis was to identify the actual costs of producing each unit of service so that cost recovery targets could be established for each individual patient service.

Data on costs are recorded by the hospital according to expenditure categories such as personnel, paper, supplies, and telephones. These categories can be thought of as inputs to the process of producing hospital services. The object of the cost analysis is to assign these costs (inputs) to services that are directly linked to patient care (outputs) in order to determine the amount of these costs which are expended when the services of the institution are produced. Ultimately, we want to know what a patient service, such as a normal delivery or an outpatient visit, costs.

Though the Hospital German Urquidi provides comprehensive MCH services, for the cost analysis which follows and the pricing model based on this analysis, only maternity services were considered. This separation was facilitated by the administrative structure of the hospital, which consistently isolates the accounts of the maternity wing from those of the pediatrics wing. For example, these services are housed on separate floors of the hospital, have separate telephone lines and other overhead accounts, have distinct routine utilization reporting, and so forth.

A. Cost Analysis Methodology[12]

Period of Observation: In order to base the cost estimates in current Bolivianos, the period of observation for the cost analysis was limited to 1990. The hospital accounting department maintains up-to-date accounting records (at the time of this consultancy, through September 1990). Processing of utilization data lags a month or so behind accounting information, such that at the time of this consultancy information was available through August 1990. The period of observation for the cost analysis therefore was set as January through August of 1990.

Estimation of Input Costs:[13] Input costs are reflected in budgetary line items.[14] In Bolivia, all public sector accounting (including MOH hospitals) follows standard accounting rules set by the Government of Bolivia. As a result, input costs could be identified in hospital accounting records such as the general ledger.

These standard line items reflect the level of expenditure for different categories of inputs. Some line items were combined with related categories, in order to simplify estimation of input costs. The line item categories used, which together represent total expenditure for the facility for the period of observation, are listed below.

---

[12] While wishing to avoid cost analysis jargon, some precise terms must be used to explain the process of deriving costs. Simple definitions are provided for each such term.

[13] Input costs are the costs which are incurred to produce services.

[14] Line items are standard budgetary categories.

Previous Page Blank

STANDARDIZED INPUT CATEGORIES

ITEM #	CATEGORY
110	Permanent employees
120	Non-permanent employees
211	Communications
212	Electricity
213	Telephone
221	Transportation
241	Equipment replacement
250	Professional services
311	Food
330	Textiles and materials
341	Paper and writing supplies
343	Paper products
346	Journals
354	Rubber products
362	Fuel
365	Pharmaceuticals
370	Glass/porcelain products
391	Cleaning materials
393	Kitchen utensils
394	Minor medical/surgical instruments
395	Office and instructional supplies
431	Machinery and equipment

As a first step, these input costs are assigned to cost centers in the hospital. These cost centers are of two types; those that contribute to other operating activities such as administration and laundry and those that are direct components of hospital services such as the surgical theater and the general or surgical wards. The costs associated with the first group of cost centers need to be reallocated to the direct hospital services that they support.

As mentioned above, the hospital is responsible for generating all of the resources necessary to meet these input costs, with one exception. Permanent employees (Item 110) are paid by Central GOB Treasury, and therefore represent input costs which do not have to be met by the hospital. This becomes an important point in the cost analysis which follows.

Step-down analysis and allocation rules: Step-down cost analysis involves an estimation of what proportions of the input costs are used by each cost center.[15] This is done by tracing the use of resources to the cost center, and estimating the other resources which are indirectly used by those cost centers, such that all input costs incurred by the facility can be attributed to a cost center.

---

[15] A cost center is a place where sets of resources are used or consumed, and converted into some kinds of outputs. Examples of cost centers are inpatient wards, laundry services, food services, the surgical theaters, and so forth. These are all places where inputs such as personnel, supplies, equipment, electricity and so forth are used.

Allocation of input costs to cost centers was performed in three ways.

(1) Direct allocation: Certain input costs could be directly allocated to cost centers. For example, all service personnel are assigned to specific wards within the hospital: therefore, the costs of those personnel can be taken from the accounting department and allocated to those cost centers.

(2) Allocation based on proportional estimates: Other categories can be allocated based on demonstrated use of resources by cost centers during a given period of observation. Prior to the early 1980s, the hospital performed a kind of step-down cost analysis on a regular basis. One individual in the statistics department of the hospital had received training in step-down cost accounting. This individual initiated a cost analysis exercise in May of 1990, but was unable to complete the analysis due to limitations in his training. He was able, however, to tally records in the pharmacy, the laundry, the kitchen and a few other cost centers, and thereby determine what proportion of drugs and food were used by each service center. These proportions were accepted at face value and applied accordingly to the cost categories.

(3) Indirect allocation: Remaining categories were grouped under operating overhead and allocated based on some selected allocation rule. For this analysis, these other costs were allocated to cost centers based on the proportion of personnel costs consumed by each center, with the assumptions that (a) personnel costs reflect volume of activity and (b) this volume of activity would also be reflected in non-personnel inputs.

The input costs were thus allocated according to these three decision rules, in the groupings shown below.

1. Direct Allocation

110 Permanent employees
120 Non-permanent employees
212 Electricity
213 Telephone

2. Proportional estimates

311 Food
365 Pharmaceuticals

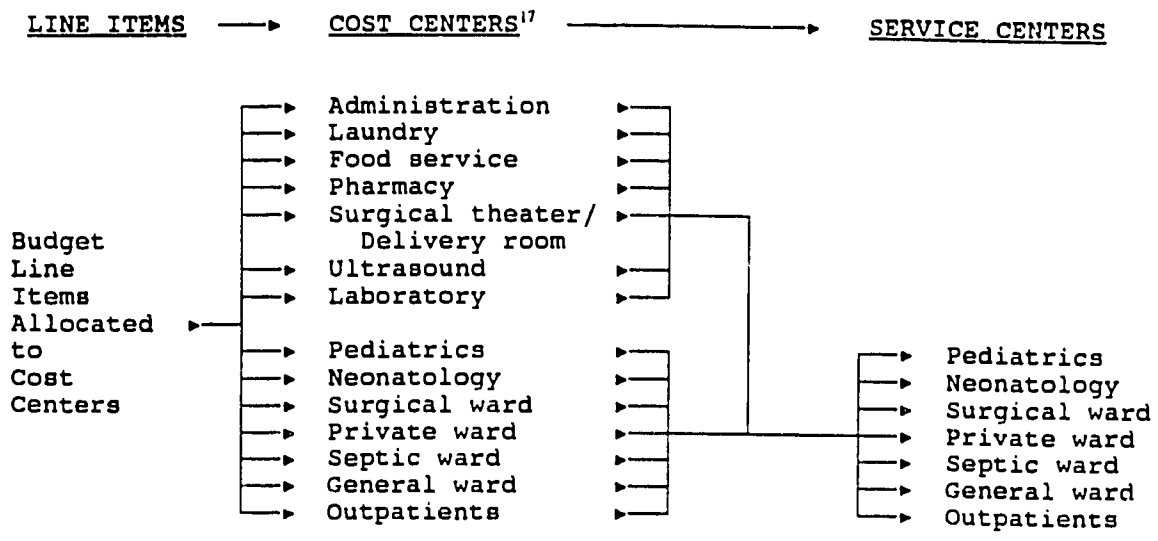
3. Indirect allocation

211 Communications
221 Transportation
241 Equipment replacement
250 Professional services
330 Textiles and materials
341 Paper and writing supplies
343 Paper products
346 Journals
354 Rubber products
362 Fuel
370 Glass/porcelain products
391 Cleaning materials
393 Kitchen utensils
394 Minor medical/surgical instruments
395 Office and instructional supplies
431 Machinery and equipment

The next step taken was to allocate input costs from those cost centers which do not provide services to those which do; we call these service centers.[16] Allocation of costs from indirect cost centers depends on how much of the production of these indirect cost centers goes to support the activities of each of the service centers. In this way, the costs incurred by all cost centers are allocated to those areas which actually provide services. This allocation process is shown in Figure 11 below.

[16] Service centers are those places where direct services are actually produced, such as inpatient wards, outpatient departments, surgical theaters, and laboratories.

FIGURE 11
SCHEMATIC REPRESENTATION OF ALLOCATION STEPS



With existing records, and by following the steps described above, it was possible to determine how much of the input costs were being consumed by each service center. The result of this process is a set of total cost figures for each of the final hospital service centers.

B. Deriving Unit Costs

With information on the total costs allocated to cost centers and service centers, we know what is being spent to operate those service centers with the observed level of output. The next step is to derive unit costs for specific services being offered.[18]

Unit costs are estimates of the cost of providing an individual service delivery unit, such as a single day in the hospital, a single outpatient visit, or a single surgical operation. These are derived by dividing the total costs for each service center by the number of service units provided. Limitations of unit cost estimates arise because the costs are based on the observed volume of services provided. Fixed costs such as personnel stay the same, even though volume fluctuates, and this causes the unit prices to vary considerably. Other costs, such as medicines or other supplies, vary

[17] Because the surgical theater and the delivery room share space, staff and equipment, it is difficult to obtain precise estimates of the differential costs attributed to these two service centers. They are therefore treated here as a single service.

[18] A unit cost is simply an estimate of the average cost represented by each individual unit of service provided. This is not to be confused with the marginal cost, which is the cost of providing an additional unit of service.

with the variation in volume. Nevertheless, this provides a reasonable estimate of the cost based on the observed volume of services.

Estimates of unit costs are the product of a number of different components, and these components can be identified individually. That is, the cost of a day in a given ward for an individual patient (a "patient day") is the sum of the personnel costs, pharmaceutical costs, and overhead costs, as well as all the other cost centers (laundry, food services, etc.) which support that patient day. Table 7 shows the resulting estimates of unit costs for the different maternity service centers within the hospital, with all inputs including pharmaceuticals factored in on an average basis.

C. Deriving Costs of Services through Cost Coefficients

The estimates of the unit costs of hospital service centers provides the basis for estimating the unit costs of particular patient services. In the case of outpatient visits, the hospital service and the patient service are the same. However, many other patient services, such as deliveries, draw upon a number of hospital services in a single hospital episode. For this analysis, costs are estimated for simple deliveries and for cesarian deliveries, two of the major patient services provided by the hospital. The analysis was based on a sample of deliveries during the period January through August 1990. For these patient services, data were obtained on the average use of hospital services; days of service in general ward, days of service in the surgical unit, and use of operating and delivery rooms. The results of this analysis is presented in Table 8 and provide an average recipe for the production of each of the two types of delivery. The cost of a normal delivery is, therefore, the unit costs of each of the hospital service inputs times the amount of each used on average. These data provide the basis for the cost-based pricing model presented in the next section.

During the study period, January through August 1990, a normal delivery used an average of 2.4 days in the general ward, one unit of service of the delivery room, and some amount of oxygen and drugs. A cesarian section, on the other hand, used an average of 8.9 days as an inpatient, part of which was spent in the surgical ward and part of which was spent in the general ward, in addition to time in the operating theater. Of course, a cesarian section also involves different amounts of oxygen and drugs, as well as blood and other inputs.

These service units together represent the total cost of an episode such as a normal delivery or a Cesarian section. Based on estimates of service coefficients, the cost per admission for normal and cesarian deliveries is shown in Table 8.

TABLE 7
ESTIMATED UNIT COSTS
(in Bolivianos)

	Out-Patients	General Ward	Septic Ward	Private Ward	Surgical Ward	Neonatal Unit	Operating/ Delivery Room
AGGREGATE COSTS							
Personnel Costs	43,927	64,668	19,545	21,710	38,092	57,718	62,882
Fixed Costs	8,995	34,898	6,970	5,630	6,058	13,302	11,481
Variable Costs							
Drugs	46,828	45,563	34,985	8,046	46,828	13,651	44,884
Other	2,307	14,114	5,394	4,406	6,901	4,136	14,088
Total without Personnel	58,129	94,575	47,350	18,082	59,788	31,089	70,453
PRODUCTION							
Outpatient Visits	3,190						
Patient Days		5,849	2,652	329	1,422	1,344	
Access to Operating/ Delivery Room							2,061
Capacity		7,047	4,131	3,159	2,187		
Occupancy Rate		83.0%	64.2%	10.4%	65.0%		
UNIT COSTS							
Fixed Costs	2.82	5.97	2.63	17.14	4.26	9.90	5.57
Variable Costs	0.72	2.40	2.03	13.41	4.34	3.08	6.84
Costs Without Personnel:							
Total Without Drugs	3.54	8.37	4.66	30.55	8.60	12.97	12.41
Drug Costs	14.68	7.79	13.19	24.49	32.94	10.16	21.78
Total With Drugs*	18.22	16.16	17.85	55.04	41.54	23.13	34.18
Personnel	13.77	11.06	7.37	66.08	26.80	42.94	30.51
Total Recurrent Cost	31.99	27.22	25.22	121.12	68.34	66.08	64.69

* This line represents the cost recovery target for the hospital.

TABLE 8
ESTIMATED COSTS OF SERVICES
EXCLUDING PERSONNEL ITEM COSTS
(Costs in Bolivianos)

	Coefficient	Unit Cost	Component Cost	
NORMAL DELIVERY				
SERVICES:				36.68
General Ward	2.9	8.37	24.28	
Delivery Room	1.0	12.41	12.41	
PRODUCTS (DRUGS/OTHER):				44.37
General Ward	2.9	7.79	22.59	
Delivery Room	1.0	21.78	21.78	
TOTAL COST				81.05
CESARIAN DELIVERY				
SERVICES:				87.46
Surgical Ward	2.4	8.60	20.65	
General Ward	6.5	8.37	54.41	
Operating Room	1.0	12.41	12.41	
PRODUCTS (DRUGS/OTHER):				100.84
Surgical Ward	2.4	32.94	79.06	
General Ward	6.5	7.79	50.63	
Operating Room	1.0	21.78	21.78	
TOTAL COST				188.30

VI. The Cost-based Pricing Model

A. Structure of the Model

Using the estimates of unit costs and the costs of services, an interactive computer spreadsheet model was developed to estimate the prices that would need to be charged to meet cost recovery targets. These prices are estimated in four steps.

(1) The costs of services and their component costs are estimated, based on the cost analysis performed above.

(2) Adjustments are made to account for variations in these costs which would be expected by virtue of changes in utilization. For example, if more patient days are produced at the facility, the fixed unit costs would decrease (because the fixed costs would be divided by higher denominators) and the variable costs would increase (because the numerator and the denominator increase together). This differentiation is built into the spreadsheet.

(3) One-third of the total revenues from the sale of services (this excludes the sale of pharmaceuticals and blood, which fall under the category of "sale of products") are contributed to the *Fondo Comun*, and are therefore added to the estimated costs of producing those services.[19]

(4) An exemption rate is introduced to the model. It is projected that a certain percentage of all patients will be unable to pay, and the costs of services provided to this group must be recovered in the overall price structure.

The resulting cost-based pricing model is designed to be used with Lotus 1-2-3 software; a depiction of the main screen seen by the user is shown in Figure 12. The only part of this model which is interactive are the three variables presented on the main screen: (1) occupancy rate in the general ward, (2) occupancy rate in the surgical ward, and (3) exemption rate. As any of these three variables are changed, the iterative model recalculates what the expected cost of providing services would be. This includes the cost of a normal delivery, the cost of a cesarian section, a cost per bed day, and the drug costs associated with each of those services.

---

[19] The *fondo comun* (literally "common fund") sets aside a portion of revenues for distribution to hospital personnel, in order to supplement their income. The proceeds from the funds are distributed on a per capita basis to all hospital employees, including medical, administration, and support staff. It was originally intended to provide an incentive to employees to provide better services and generate utilization.

FIGURE 12

GERMAN URQUIDI MATERNITY HOSPITAL
COST-BASED PRICING MODEL

ASSUMPTIONS - UTILIZATION OF CAPACITY:

GENERAL WARD	—▸	83 %
SURGICAL WARD	—▸	65 %
EXEMPTION RATE	—▸	8 %

TARGET PRICE:

NORMAL DELIVERY (without drugs)	—▸	101
CESARIAN (without drugs)	—▸	236
DAY, GENERAL WARD	—▸	14
DAY, SURGICAL WARD	—▸	14
OPERATING ROOM FEE	—▸	20
DELIVERY ROOM FEE	—▸	20

DELIVERIES PER YEAR

NORMAL	>>	1,482
CESARIAN	>>	713

CONTRIBUTION TO THE FONDO COMUN OF EACH:

NORMAL DELIVERY	—▸	17
CESARIAN DELIVERY	—▸	40
TOTAL CONTRIBUTION/YEAR	—▸	8,673

B. Use and Interpretation of the Model

When the model is used, the default screen approximates the levels of utilization, and the level of non-payment, observed during 1990. Changes in utilization and exemption rates can be introduced, and this generates a change in the estimated price which would have to be charged to attain cost recovery.[20]

The model can be used on two broad levels. The simplest level is as a passive tool to help set targets for pricing, for utilization, and for exemptions. A more sophisticated application of this model is to estimate the ability of the hospital to cross-subsidize services and to identify potential pricing packages. For example, the projected level of utilization would result in a cost per normal delivery of approximately 81 Bolivianos. This is the amount which would have to be charged to recover the cost of providing services. If a higher amount were charged, say 130 Bolivianos, then each paying visit would generate a surplus of 49 Bolivianos. This extra 49 Bolivianos can be applied toward a number of objectives. A few examples of these are:

(1) Applied to subsidize pediatric services. In practice, the current price structure subsidizes both pediatrics (which may be desirable) AND the private ward (which is undesirable).

(2) Applied to subsidize the indigent. The model currently does this by allowing the user to specify the proportion of all fees to be exempted (not paid by the patient). It then estimates the price to be charged to the rest of the patients to generate the required total costs for all services provided.

(3) Applied to "bundled" services. Additional services can be offered free of charge, with their cost covered by the delivery charge. This might allow the hospital to offer prenatal care or post natal care for "free", if the payment were to be bundled with the delivery fee. The model allows the user to estimate how many "units" of prenatal care can be provided under this scenario by seeing what the unit cost of an outpatient visit is (18.22 Bolivianos at the sample levels of utilization).

---

[20] User of the model will notice that the rest of the spreadsheet model is "protected". That is, the user is not able to change any cells other than the three variables; attempts to do so will result in a "beep", without accepting the change. On a color monitor, the variables appear as highlighted cells.

VII. Follow-on Activities

The MotherCare activities in Cochabamba are directed at improving maternal and neonatal outcomes through more informed and effective utilization of services and improved quality of service. Achieving this goal requires understanding the basis for current patterns of use and the factors which influence both the supply of and demand for maternal and neonatal medical services. The analysis presented here represents a first step in examining the economic and financial attributes of the system of services in Cochabamba. It is important, however, to recognize that the Hospital German Urquidi is only one of many providers of care. As a referral facility, its experience can only be interpreted in the context of the system of services as a whole.

Other MotherCare activities will describe and analyze additional dimensions of the system. In particular, the planned field surveys and the qualitative research will provide insight into provider and patient behaviors. The issues raised in this study demonstrate the importance of obtaining information on patterns of demand and expenditures as part of the household surveys. It also shows the importance of including economic factors that affect the quantity and quality of supply, as part of the provider interviews. These data will provide a much better picture of the working of the delivery system and the factors that affect its performance.

With specific reference to the economic and financial analysis, a similar study of another MPSSP facility, particularly one serving an area targeted for the household survey, would add considerably to the utility of the current findings. The short visit to the general hospital at Quillacollo suggests that the experience of that institution would contrast greatly with the experience of the referral hospital. In particular, its reported increase in normal deliveries in spite of an evident growth in alternative providers in the same location needs to be explored more directly. How much this experience reflects perceived differences in quality on the part of the users or differences in economic factors can only be assessed by more systematic analyses.

It is clear from this study that the area served by the hospital is quite diverse with considerable growth in supply and, presumably, considerable variation in the quality of services. Even more important is the evidence that assessing the performance of any single provider out of the context of the system as a whole is not likely to be very informative. Further understanding of the market in terms of provider costs and the quantity and quality of output would contribute greatly to our ability to interpret the Hospital German Urquidi experience in terms of its implications for services in Cochabamba as a whole.

The suggestions of Dr. Solari, attached to this study, also point out opportunities to utilize this analysis to improve the ability to assess institutional behavior and to identify areas of management priority. While his comments focus on the model, he makes clear the need to utilize the model and the analyses that support it as an exercise in improved institutional and regional planning. The suggestions above for extending this effort and linking the institution-based economic and financial studies to the other analyses of provider and user behavior are recognition of the priority of this goal.

VIII. Appendix: Interpretations and Applications of the Cost-based Pricing Model, by Dr. Alfredo Solari, Minister of Public Health, Uruguay

A. Applicability of the Model in the Management of Public Sector Maternity Referral Facilities

The model allows the authorities of the hospital to know how much they should charge for each delivery and each Cesarian in order to recover the recurrent costs (with the exception of personnel costs) under conditions where the following attributes can vary:

1) The Occupancy Rate of the General Ward
2) The Occupancy Rate of the Surgical Ward
3) Waiver/exemption/non-collection rate

The model appears to be most useful when it is applied not to set prices but to compare prices and costs by service and type of patient (normal or Cesarian) and volume of services. Too often public sector hospitals charge prices that are completely unrelated to their own costs of operation. However, to be definitive for this purpose the model should incorporate measures of quality of care and patient outcome since the costs to be recovered may vary in relation to these attributes and price may vary at the expense of both. It is difficult to find handy specifications for these two categories of variables. For maternity and newborn quality of care a standardized medical record has been developed by PAHO's Centro Latinoamericano de Perratologia (CLAP). Since it is pre-coded, it can be easily processed in order to assess the quality of care provided to the patients. In particular, it allows the assessment of variables that have been specifically targeted by MotherCare as prioritized activities; i.e. prevention of neonatal tetanus, prevention of hypothermia, Apgar scores, early initiation of exclusive breastfeeding and early recognition of appropriate care of sick newborns.

As well, CLAP's standardized perinatal record allows one to collect and process easily some measures of maternal and newborn outcomes beyond mortality. It is not in this report where these morbidity variables should be specified. However, there are several that could be selected in order to reflect the outcomes of pregnancy and delivery as well as their relationship to the variables presently included in the model.

With this additional information and with the aim of increasing efficient management rather than setting prices, the model can be useful in other maternity referral centers. It has to be kept in mind though that the allocation of costs to each cost center following the step down procedure, would have to be repeated for every facility in which it would be applied since the proportions are likely to vary from one hospital to another.

In order for the model to be useful for price-setting, the medical staff, the Administration and the Medical Director must have some ability to anticipate and, perhaps influence, these three variables. Rephrasing the model it could be stated that it enables one to set prices given some assumptions about:

(1) Number of Cesarians
(2) Number of normal deliveries
(3) ALOS for Cesarians
(4) ALOS for normal deliveries
(5) Proportion of Cesarians over total deliveries
(6) Non-collection (or waiver or exemption) rate

When such variables are established by conditions external to the institution, the model provides a means for establishing prices required to cover costs. As will be noted later, it does not tell anything about whether people would be willing or able to pay those charges. There are also a number of potential problems associated with the fact that the variables themselves may be influenced by the institution.

The hospital could have relative control over variables 1 (number of cesarians) and 2 (number of normal deliveries). However, ALOS varies widely for both types of deliveries and the aim should be to keep them to the minimum compatible with good outcome. In other words, even if the staff were very disciplined, it would be inappropriate on health or ethical grounds to manipulate both ALOS to fit the assumption. Second, variable 5 (proportion of cesarians over total deliveries) has 5 been shown to be controllable and even adjustable (manipulated) by the medical staff. There are however wide variations across physicians in the same hospital and across hospitals depending on the method of payment to the physician, the rate of previous Cesarians and technical considerations (safer for the child, etc.). While many of the incentives which have been shown to increase the cesarian rate beyond the medically necessary are not present in this setting, the potential for such results needs to be directly considered.

The rate of Cesarians over total number of deliveries has been increasing in most maternity hospitals of South America. The key question in relation to the applicability of the model is whether the observed level of this variable reflects manipulation by the medical staff or whether it is the natural result of the medical situations that present themselves to the hospital. (In this case, of course, since the hospital is a referral maternity facility, its percentage of Cesarians should be higher than for general hospital/maternity units.)

Accordingly variable (a) and (b) are influenced by decisions made by the hospital and to some extent, they could be managed. However this poses a second question, the impact of price elasticity of demand. The model does not consider the interaction between the level of prices and the intensity of use. In effect, it assumes they are independent (although in the model, higher use will yield lower unit costs). It is simply based on average use of a facility and average unit cost of the service provided by the facility. If this is the case, then a number of deliveries higher than expected would result in a price being charged that is greater than the break-even price and vice versa.

Another aspect of importance is the problem of the number of events - normal deliveries and Cesarians - that take place in the hospital and their relationship to the size of the entire market. In the setting of Cochabamba, hospital deliveries compete with deliveries performed in other settings like private hospitals and clinics and with those performed at home. In a competitive environment like this, not quantified in the study, where women are described as determining prices from different settings before making decisions about the form and location of delivery, it is likely that the total number of deliveries that take place in the hospital is at least partially sensitive to price as well as to changes in the overall supply.

In effect, according to the paper, as prices increased between 1987 and 1989 (even in constant value although not at the rate indicated in the paper), the total number of deliveries decreased from 3171 in 1987 to 2420 in 1989. A decrease in the number of total births in the Cochabamba region is not mentioned and is highly unlikely to explain this substantial reduction. It is likely that other factors, such as changes in the supply, were important, but the effect of price (price elasticity) should not arbitrarily be ruled out.

Fourth, the more manageable variable is "non-collection rate," since the hospital could establish, based on experience, rules of collection in specific situations that would yield a targeted rate. However, for this policy to be applied in a way that is compatible with the overall goals of the MotherCare project, careful consideration has to be given. In effect, setting a relatively high target of "non-collectibles" (say 40%) could result in prices for patients that are classified as collectible, that are non-competitive with the rest of the market thus forcing the closure of the facility. On the other hand, setting a target that is low (5%) could cause the rejection of a large number of deliveries that would benefit from care in a referral center, because even if prices are lower than otherwise, some people may not be able to afford them and they may not be waived either.

Thus, the model has limitations as a management tool since, if targets are set unrealistically, it could lead to the development of a set of incentives which encourage poor outcomes such as more Cesarians than appropriate, rejection of patients that can't afford the prices, or longer than necessary lengths of stay.

B. Implications of Costing Analysis for Ministry-level Planning

This study was initiated by a concern at the regional level (Unidad Sanitaria) with the potential effect of increased (hospital) prices upon the number of deliveries performed in the hospital. The assumption was that a large increase in fees had produced a reduction in the demand for hospital deliveries. This is a legitimate concern for a central authority, be it at the level of the Unidad Sanitaria (UNS) (regional) or at the Ministry of Health (MOH) (national).

The results obtained, besides uncovering other relationships, confirm the assumption that the number of deliveries was declining. However, they do not allow one to establish a cause-effect relationship between price increases and reduced number of deliveries. Thus, what is a relevant and important concern at the UNS or MOH levels cannot be properly answered using only the information gathered to carry out this phase of the Mothercare effort.

Before entering into the planning activity at the MOH and its relationship with the costing analysis, it is important to notice that the study raises several questions that should be of technical concern for the central authorities:

1) Why are Cesarians increasing both in absolute and in relative terms? Is it that the role of the hospital as a referral center is finally taking hold and thus more complicated clinical situations come to it? Or alternatively, is it that fewer patients are coming to it and, in order to meet cost recovery targets, a more costly procedure is being selected? Between 1989 and 1989 a reduction of around 13% in the number of deliveries, and an overall reduction of some 8% in the total discharges, was more than compensated by a change in service mix leading to an increase of 30% in the number of hospital days produced.

2) Looking at these figures, the main question for a MOH officer would be: is this increase in hospital days produced (and paid at least partially by the patients) justified? Has it lead to an increase in quality of care and health outcomes that are of similar magnitude? If they were better outcomes, could they have been achieved without such an increase in the financial effort?

3) Are these additional Cesarians and the ensuing increase in patient days performed on sound technical basis? Are they being produced through increased productivity or are they consuming additional human resources that could be used elsewhere?

In terms of planning, either at the level of UNS or of the MOH, the costing model could be useful for the following reasons:

1) it gives an estimate of real costs for normal deliveries and Cesarians; information that is not usually available in planning offices

2) it also provides some information (although with some limitations as seen before) on how those costs vary according to percentage of Cesarians occupancy rate and proportion of non-collectible bills;

3) knowing the entire number of deliveries in the planning region, it provides a good estimate of what proportion of those can be dealt with by a referral center of known size and staffing pattern.

However, in terms of planning delivery facilities, the model should be enriched with some information about the market. The study does not tell and the model does not include information about the role played by the hospital in terms of the relative risk of the deliveries it handles in relation to other deliveries occurring in the Cochabamba area. There are some hints but not data indicating that the role of the hospital is changing away from normal deliveries and more into solving more complicated cases of which the increased proportion of Cesarians is a manifestation. However, for planning purposes it would be necessary to know whether this is due to a change of the role of the hospital (working more as a referral facility) or just a change in the style of practice.

In order to be more useful from a planning point of view, the model should try to include two additional variables:

1) appropriateness of the referrals it gets from other facilities or practitioners

2) an estimate of deliveries with relatively high risk that should have taken place in the hospital but were performed elsewhere.

Some of this information could be obtained by implementing PAHO's standardized Perinatal Medical Record as indicated above, not only in the hospital but also elsewhere, private clinics, NGO facilities, others. However, the model could not be satisfactory as a planning device if some information about home deliveries were not included. Such information might be obtained from Birth Certificate Records if they are routinely available. This becomes more problematic for more rural populations. In effect, the main concern for planning purposes, is with those deliveries that occur at home despite bearing high risks of poor outcome.

Finally, for planning purposes and assuming that compatible information is available for several facilities of similar level of development, the model should include all cost items, particularly centrally financed personnel. In this way, it would reflect the true cost of the system.

IX. Persons Contacted in the Course of the Study

USAID (La Paz):

Mr. Paul Hartenberger, Chief, HHR
Ms. Sigrid Anderson, Deputy Chief, HHR
Ms. Sandy Wilcox (PSC)

Unidad Sanitaria (Cochabamba):

Dra. Magalí de Zannier, Directora ad interino
Dr. Robert Vargas, Ex-Director
Lic. María Isabel Pueyo, Gerente Adminisatrativa, Proyecto Fortelecimiento Infraestructural
Lic. Eduardo Vexina, Coordinador de Distritos
Lic. Elizabeth Montoya, Auditora Interna
Dr. Ciro Larrasaba, Jefe de Planificación
Arq. Hernán Mercado, Staff Architect
Lic. Max Alegre, Administrator, Hospital Viedna
Dr. Johnny Nava, Director, Hospital Quillacollo
Dr. Carlos Nava, Director Medico de Servicios Rurales

Hospital German Urquidi (Cochabamba):

Dr. Walter Salinas, Director
Lic. María Elena M. de Camacho, Contadora
Lic. Reynaldo Salomón
Lic. Adelia Gonzalez, Jefa de Estadística